

# Leica GR10/GR25

## User Manual



Version 4.0  
English

- when it has to be **right**

**Leica**  
Geosystems

# Introduction

## Purchase

Congratulations on the purchase of a Leica GR10/GR25.

## Product identification

The type and serial number of your product are indicated on the type plate. Always refer to this information when you need to contact your agency or Leica Geosystems authorised service workshop.



This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "1 Safety Directions" for further information. Read carefully through the User Manual before you switch on the product.



## Trademarks

- Windows is a registered trademark of Microsoft Corporation in the United States and other countries
  - SD Logo is a trademark of SD-3C, LLC.
  - *Bluetooth®* is a registered trademark of Bluetooth SIG, Inc.
- All other trademarks are the property of their respective owners.

## Validity of this manual

This manual applies to the GR10/GR25.

## Available documentation

Name	Description/Format		
GR10/GR25 Quick Guide	Provides an overview of the product together with technical data and safety directions. Intended as a quick reference guide.	✓	✓
GR10/GR25 User Manual	All instructions required in order to operate the product to a basic level are contained in the User Manual. Provides an overview of the product together with technical data and safety directions.	-	✓
GR Series Operational Manual (Online Help)	Comprehensive guide to the product and the operation. Includes a description of the hardware installation and common accessories. Software setup is described in detail, along with the technical specifications. The complete manual can be viewed online via the GR Series Web interface.	-	✓
GNSS Reference Station and Networks - An Introductory Guide	Offers practical advice on how to set up and run individual GNSS reference stations and networks of stations and to provide the services that are required.	✓	✓
GNSS Networks and Reference Stations Equipment List	Detailed list of equipment available for GNSS reference stations including hardware and software.	-	✓

**Refer to the following resources for all GR10/GR25 documentation/software:**

- the Leica CD
- <https://myworld.leica-geosystems.com>

myWorld@Leica Geosystems (<https://myworld.leica-geosystems.com>) offers a wide range of services, information and training material.

With direct access to myWorld, you are able to access all relevant services whenever it is convenient for you, 24 hours a day, 7 days per week. This increases your efficiency and keeps you and your equipment instantly updated with the latest information from Leica Geosystems.

Service	Description
myProducts	Simply add all Leica Geosystems products that you and your company own. View detailed information on your products, buy additional options or Customer Care Packages (CCPs), update your products with the latest software and keep up-to-date with the latest documentation.
myService	View the service history of your products in Leica Geosystems Service Centers and detailed information on the services performed on your products. For your products that are currently in Leica Geosystems Service Centers view the current service status and the expected end date of service.
mySupport	Create new support requests for your products that will be answered by your local Leica Geosystems Support Team. View the complete history of your Support and view detailed information on each request in case you want to refer to previous support requests.
myTraining	Enhance your product knowledge with the Leica Geosystems Campus - Information, Knowledge, Training. Study the latest online training material or download training material on your products. Keep up-to-date with the latest News on your products and register for Seminars or Courses in your country.

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# 1 Safety Directions

## 1.1 General Introduction

### Description

The following directions enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

### About Warning Messages





Warning messages are an essential part of the safety concept of the instrument. They appear wherever hazards or hazardous situations can occur.

#### Warning messages...

- make the user alert about direct and indirect hazards concerning the use of the product.
- contain general rules of behaviour.

For the users' safety, all safety instructions and safety messages shall be strictly observed and followed! Therefore, the manual must always be available to all persons performing any tasks described herein.

**DANGER, WARNING, CAUTION** and **NOTICE** are standardized signal words for identifying levels of hazards and risks related to personal injury and property damage. For your safety it is important to read and fully understand the table below with the different signal words and their definitions! Supplementary safety information symbols may be placed within a warning message as well as supplementary text.

Type	Description
 <b>DANGER</b>	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury.
<b>NOTICE</b>	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in appreciable material, financial and environmental damage.
	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.



## 1.2

## Definition of Use

<b>Intended use</b>	<ul style="list-style-type: none"><li>• Carrying out measurement tasks using various GNSS measuring techniques.</li><li>• Recording GNSS and point related data.</li><li>• Data communication with external appliances.</li><li>• Measuring raw data and computing coordinates using carrier phase and code signal from GNSS satellites.</li></ul>
<b>Reasonably foreseeable misuse</b>	<ul style="list-style-type: none"><li>• Use of the product without instruction.</li><li>• Use outside of the intended use and limits.</li><li>• Disabling safety systems.</li><li>• Removal of hazard notices.</li><li>• Opening the product using tools, for example screwdriver, unless this is permitted for certain functions.</li><li>• Modification or conversion of the product.</li><li>• Use after misappropriation.</li><li>• Use of products with recognisable damages or defects.</li><li>• Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.</li><li>• Inadequate safeguards at the working site.</li><li>• Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.</li></ul>

## 1.3

## Limits of Use

<b>Environment</b>	<p>Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.</p> <p><b>For the Power Supply:</b> Suitable for use in dry environments only and not under adverse conditions.</p> 
 <b>DANGER</b>	<p>Local safety authorities and safety experts must be contacted before working in hazardous areas, or close to electrical installations or similar situations by the person in charge of the product.</p>

## 1.4

## Responsibilities

<b>Manufacturer of the product</b>	<p>Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a safe condition.</p>
<b>Person responsible for the product</b>	<p>The person responsible for the product has the following duties:</p> <ul style="list-style-type: none"><li>• To understand the safety instructions on the product and the instructions in the user manual.</li><li>• To ensure that it is used in accordance with the instructions.</li><li>• To be familiar with local regulations relating to safety and accident prevention.</li><li>• To inform Leica Geosystems immediately if the product and the application becomes unsafe.</li><li>• To ensure that the national laws, regulations and conditions for the operation of e.g. radio transmitters or lasers are respected.</li></ul>

## 1.5

### 1.5.1

## Hazards of Use

### General



#### CAUTION

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

##### **Precautions:**

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.

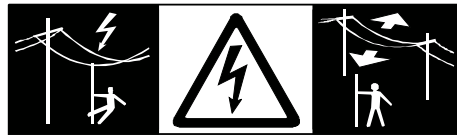


#### DANGER

Because of the risk of electrocution, it is dangerous to use poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.

##### **Precautions:**

Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.



#### WARNING

During dynamic applications, for example stakeout procedures there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.

##### **Precautions:**

The person responsible for the product must make all users fully aware of the existing dangers.



#### WARNING

Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.

##### **Precautions:**

Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.



#### CAUTION

If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people can sustain injury.

##### **Precautions:**

When setting-up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position.

Avoid subjecting the product to mechanical stress.



## DANGER

If the product is used with accessories, for example on masts, poles, you may increase the risk of being struck by lightning. Danger from high voltages also exists near power lines. Lightning, voltage peaks, or the touching of power lines can cause damage, injury and death.

### Precautions:

- Be sure to remain at a safe distance from electrical installations. Do not use the product directly under or close to power lines. If it is essential to work in such an environment contact the safety authorities responsible for electrical installations and follow their instructions.
- If the product has to be permanently mounted in an exposed location, it is advisable to provide a lightning protection system. Refer to "1.5.4 Lightning Protection" for a suggestion on how to design a lightning protection system for the product. Always follow the regulations in force in your country regarding the design and installation of such a system. The installation must be carried out by an authorised specialist.
- To prevent damages due to indirect lightning strikes (voltage spikes) cables, for example for antenna, power source or modem should be protected with appropriate protection elements, like a lightning arrester. These installations must be carried out by an authorised specialist.



## CAUTION

During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

### Precautions:

Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat.

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.



## WARNING

High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.

### Precautions:

Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.



## WARNING

If battery terminals are short circuited e.g. by coming in contact with jewellery, keys, metalized paper or other metals, the battery can overheat and cause injury or fire, for example by storing or transporting in pockets.

### Precautions:

Make sure that the battery terminals do not come into contact with metallic objects.



## WARNING

Incorrect fastening of the external antenna to vehicles or transporters poses the risk of the equipment being broken by mechanical influence, vibration or airstream. This may result in accident and physical injury.

### Precautions:

Attach the external antenna professionally. The external antenna must be secured additionally, for example by use of a safety cord. Ensure that the mounting device is correctly mounted and able to carry the weight of the external antenna (>1 kg) safely.

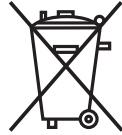


## WARNING

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorised persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

### Precautions:



The product must not be disposed with household waste.

Dispose of the product appropriately in accordance with the national regulations in force in your country.

Always prevent access to the product by unauthorised personnel.

Product-specific treatment and waste management information can be downloaded from the Leica Geosystems home page at <http://www.leica-geosystems.com/treatment> or received from your Leica Geosystems dealer.



## WARNING

Only Leica Geosystems authorised service workshops are entitled to repair these products.

**WARNING**

If unit is not connected to ground, death or serious injury can occur.

**Precautions:**

To avoid electric shock power cable and power outlet must be grounded.

**WARNING**

If you open the product, either of the following actions may cause you to receive an electric shock.

- Touching live components
- Using the product after incorrect attempts were made to carry out repairs

**Precautions:**

Do not open the product. Only Leica Geosystems authorised service workshops are entitled to repair these products.

**WARNING**

The product is not designed for use under wet and severe conditions. If unit becomes wet it may cause you to receive an electric shock.

**Precautions:**

Use the product only in dry environments, for example in buildings or vehicles. Protect the product against humidity. If the product becomes humid, it must not be used!



**CAUTION**

Direct rain or water may damage and/or reduce lifetime of the battery.

**Precautions:**

During outdoor use keep the battery in a rain protected place.

---

**CAUTION**

Long-term storage may reduce lifetime or damage the battery.

**Precautions:**

During long-term storage, maintain battery life by periodic recharge.

---

**WARNING**

During usage, charging and/or disposal one of the following can occur with impact to humans and environment:

**Explosion hazard:**

A highly explosive oxyhydrogen gas mixture occurs when charging batteries.

**Precautions:**

Fires, sparks, naked lights and smoking are prohibited:  
Avoid causing sparks when dealing with cables and electrical equipment, and beware of electrostatic discharges. Avoid short-circuits.

**Corrosive hazard:**

Battery acid is highly corrosive.

**Precautions:**

Wear protective gloves and eye protection. Do not tilt battery, acid can escape from the degassing openings or vents.

---

**WARNING**

Charging or operating the battery at temperatures below 0°C / +32°F or above +40°C / +104°F is not allowed since it may damage the battery.

**Precautions:**

Only charge the battery in well-ventilated areas because it can produce explosive gases. Connect the battery to the battery charger only when the charger is turned off. Fire, smoking, and sparking near the battery are not allowed.

---

**DANGER**

Lightning strikes can cause severe damage to structures, devices, services and human life. Therefore it is essential to consult an authorised specialist to design and install a means for reliable and efficient lightning protection.

The protection must consider all elements of your receiver installation, that is:

- Devices, for example receiver, GNSS antenna, meteo stations, radio communications (cellular mobile, terrestrial), switches, routers
- Power lines
- Signal lines, for example from an antenna
- Communication and data lines, for example Ethernet or serial
- Structures, for example building, mast, cabinet
- Solar panels

**Warranty exclusion**

Lightning may ignore every defence man can conceive. A systematic hazard mitigation approach to lightning safety is a prudent course of action.

The warranty of the receiver does not apply to, and Leica Geosystems is not responsible for defects, malfunctioning or performance issues resulting from:

- Damage caused by lightning or any other electrical discharge.

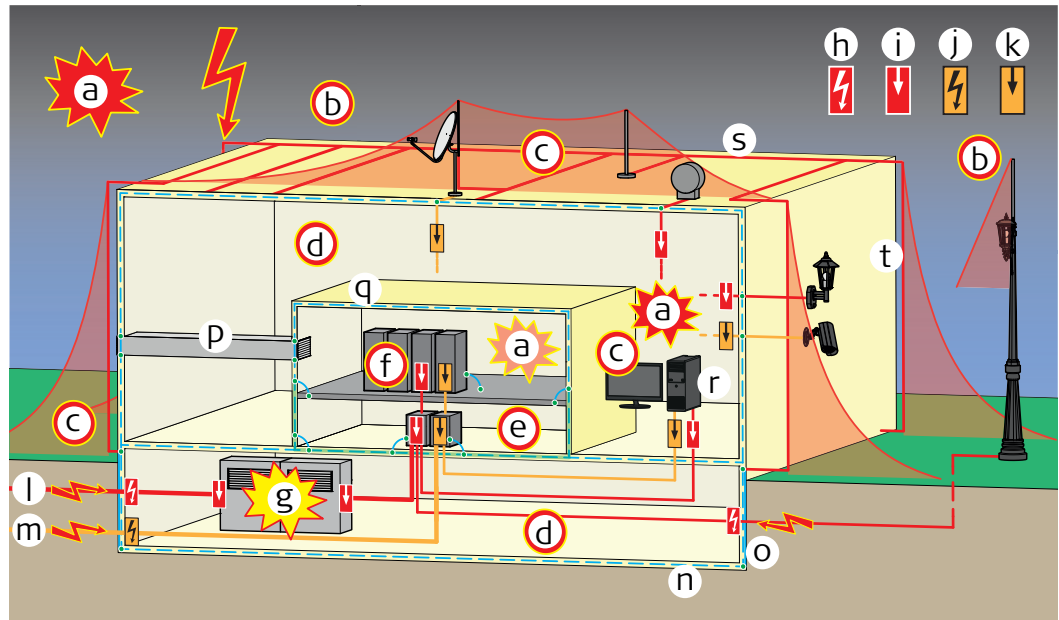
**Lightning Protection Zones**

Lightning Protection Zones (LPZ) can be divided into:

Zone	Description
External LPZ 0A, LPZ 0B	Zones which are at risk from direct lightning strikes, from impulse currents up to the whole lightning current and from the whole electromagnetic field of the flash of lightning.
Internal LPZ 1...n	Zones where impulse currents are limited by splitting the current and by <b>Surge Protective Devices (SPDs)</b> at the zones boundaries. The electromagnetic field of the lightning flash can be attenuated by spatial shielding.

At the boundary of each internal zone, the equipotential bonding must be carried out for all metal components and utility lines entering the building or structure. Equipotential bonding is done directly or with suitable SPDs.

## Lightning protection zones concept according to IEC 62305-4 (EN 62305-4)



007128.001

- a) Lightning electromagnetic pulse (LEMP)
- b) Lightning protection zone 0A (LPZ 0A)
- c) Lightning protection zone 0B (LPZ 0B)
- d) Lightning protection zone 1 (LPZ 1)
- e) Lightning protection zone 2 (LPZ 2)
- f) Lightning protection zone 3 (LPZ 3)
- g) Switching electromagnetic pulse (SEMP)
- h) Lightning equipotential bonding  
Lightning current arrester (SPD Type 1)
- i) Local equipotential bonding  
Surge arrester (SPD Type 2, SPD Type 3)
- j) Lightning equipotential bonding  
Lightning current arrester
- k) Local equipotential bonding  
Surge arrester
- l) Low voltage power supply system
- m) IT system
- n) Steel reinforcement
- o) Foundation earth electrode
- p) Ventilation
- q) Spatial shield
- r) Terminal device
- s) Air-termination system
- t) Down conductor system

## Lightning Protection Systems

Leica Geosystems recommends installing a **Lightning Protection System (LPS)** at continuously operating reference stations.

An LPS consists of an external and an internal system.

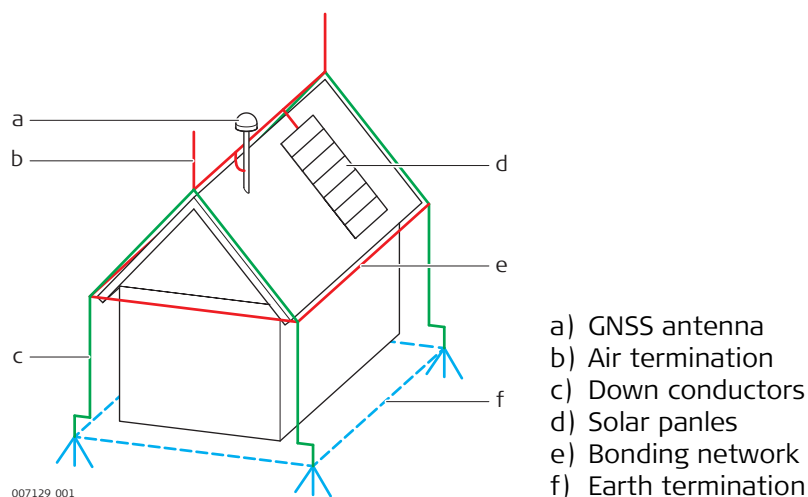
### External system

Component	Example	Purpose
Air termination system	Lightning rods	Interception of direct strikes
Down-conductor system Bonding network	-	Conduction of lightning current safely towards earth
Earth-termination system	Grounding	Dispersion of the current into the earth

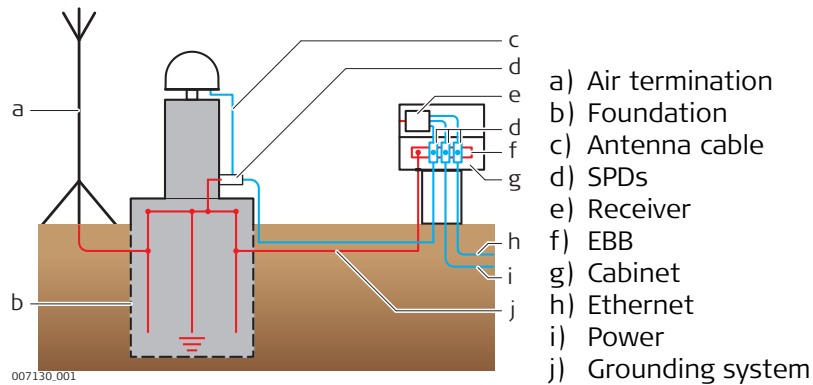
### Internal system

Component	Purpose
Equipotential Bonding Bar (EBB)	Equipotentialisation between all electric conducting parts and the protective earth conductor
Metal partition panel Suitable cable routing No crossed cables coming from different LPZ's	Attenuate transient and magnetic induced fields
Surge Protective Device (SPD)	Equipotential bonding for all metal components and utility lines entering the building or structure Examples for utility lines: Communication lines, antenna cables
Magnetic shields	Attenuation of the inducing magnetic field
Suitable routing of wiring	Reduction of the induction loop

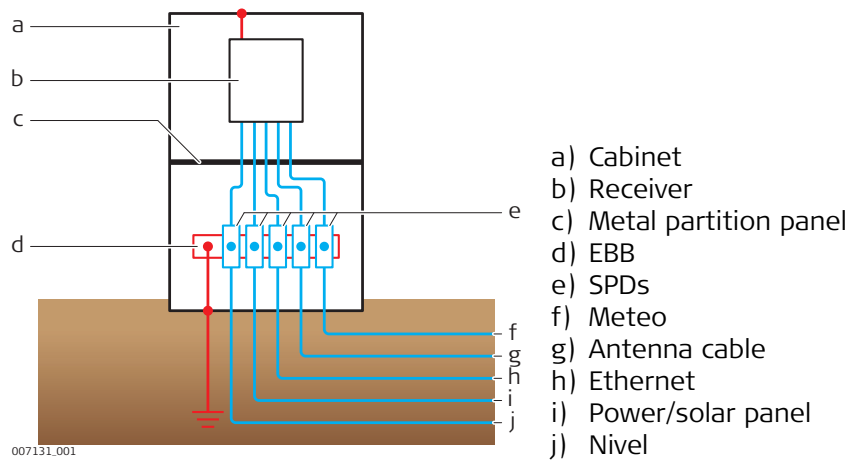
Example: External system installation on a building



### Example: External and internal system installation on a pillar



### Example: Internal system installation in a cabinet



## Active Lightning Protection System

An **Active Lightning Protection (ALP)** System combines protection with lightning detection.

### Functionality

- Carrying out preventive measures in advance
- Triggering an early streamer of ionised air.  
The streamer intercepts lightning discharges for the safe passage to a low impedance down-conductor.

Leica customers reported successful application using products from:

- Lightning Protection International Pty Ltd ([www.lpi.com.au](http://www.lpi.com.au))

## Passive Lightning Protection System

A **Passive Lightning Protection (PLP)** System and an ALP are similar. The PLP System has no detection (preventive measures) or triggers for an early streamer.

Leica customers reported successful application using products from:

- Huber and Suhner ([www.hubersuhner.com](http://www.hubersuhner.com))
- Polyphaser ([www.protectiongroup.com](http://www.protectiongroup.com))

## Down conductor system

A down conductor system consists of a bonding network that covers the outer face of a structure, for example building.  
In a steel-reinforced concrete structure, the reinforcement of the outer walls can be used as natural components.  
Structures made of insulating material, for example wood or bricks, need an extra bonding network as down conductor system.

## Grounding

As part of the external LPS, an earth termination system for grounding must address low earth impedance.  
Suitable for grounding are poles or depths/plate/ring earth counterpoises.

### Disadvantages

- Corrosions depending on the soil conditions
- Damage due to excavation

### Corrective measure

Use a foundation grounding rod. Such a rod is required for electric facilities in and at structures, for example building, pillar or mast.  
The foundation grounding rod is built into the concrete foundation of the structure.

## Equipotentialisation

Any incoming connection into a building that can transfer an electrical potential from outside to inside must be protected against electrical discharge.

### Recommendation

Deploy an EBB which is properly connected to the grounding system at the building and/or cabinet entry point.

Part	Example
Incoming connection into a building	Water, gas, communication, data or power line
Electrical discharge	Lightning surge

## Structural separation in a cabinet

### Case

A cabinet box is used to protect the receiver and electronic against environmental impacts.

### Recommendation

Use a structural separation with a metal partition panel within the cabinet.

### Purpose of a structural separation

- Separation of lightning protected and not protected part of the cabinet
- Avoiding crossed cables originating from the lightning protected and not protected part of the cabinet
- Attenuation of transient and magnetic induced fields

**Description**

The term Electromagnetic Compatibility is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.

**WARNING**

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

**CAUTION**

There is a risk that disturbances may be caused in other equipment if the product is used with accessories from other manufacturers, for example field computers, personal computers or other electronic equipment, non-standard cables or external batteries.

**Precautions:**

Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers or other electronic equipment, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

**CAUTION**

Disturbances caused by electromagnetic radiation can result in erroneous measurements.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.

**Precautions:**

Check the plausibility of results obtained under these conditions.

**CAUTION**

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

**Precautions:**

While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

## Radios or digital cellular phones



### WARNING

Use of product with radio or digital cellular phone devices:

Electromagnetic fields can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.

#### **Precautions:**

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment can be disturbed or that humans or animals can be affected.

- Do not operate the product with radio or digital cellular phone devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
  - Do not operate the product with radio or digital cellular phone devices near to medical equipment.
  - Do not operate the product with radio or digital cellular phone devices in aircraft.
-



The greyed paragraph below is only applicable for products without radio.



### WARNING

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



### WARNING

Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

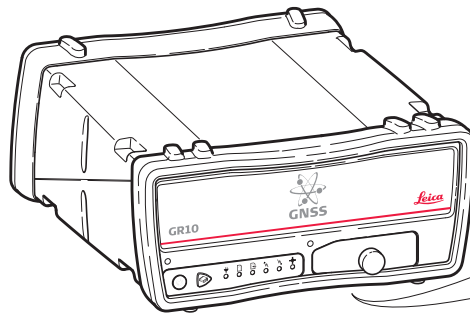


### WARNING

This Class (B) digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe (B) est conforme à la norme NMB-003 du Canada.

### Labelling GR10



GR10\_014

**Type : GR10**

S.No.: .....

Equip.No.: .....

Art.No.: .....

Power: 12-24V ~, nominal/2.5A max.

Leica Geosystems AG

CH-9435 Heerbrugg

Manufactured: 2010

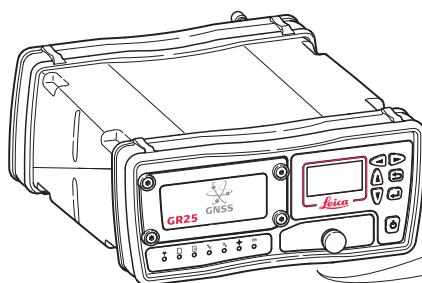
Made in Switzerland



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Labelling GR25 (Bluetooth)



002992\_002

**Type : GR25** S.No.: 1234567  
Equip.No.: 12345678 Art.No.: 769401  
Power: 12V-24V --- nominal / 2.5A max.  
Leica Geosystems AG  
CH-9435 Heerbrugg  
Manufactured: 20XX  
Made in Switzerland  
ETH MAC: 123456ABCDEF  
Contains transmitter module:  
IC: 6850-31308  
FCC-ID: 02331308  
Bluetooth QD ID: B015912

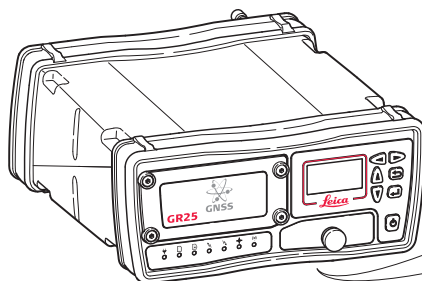
*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and  
(2) this device must accept any interference received, including interference that may cause undesired operation.*



## WARNING

This Class (B) digital apparatus complies with Canadian ICES-003.  
Cet appareil numérique de la classe (B) est conforme à la norme NMB-003 du Canada.

## Labelling GR25 (WLAN)



005235\_001

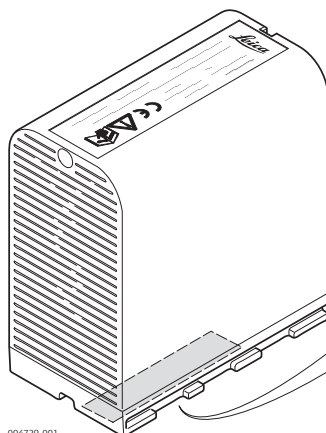
**Type : GR25** S.No.: 1234567  
Equip.No.: 12345678 Art.No.: 799084  
Power: 12V-24V --- nominal / 2.5A max.  
Leica Geosystems AG  
CH-9435 Heerbrugg  
Manufactured: 20XX  
Made in Switzerland  
ETH MAC: 123456ABCDEF  
Contains transmitter module:  
IC: 5325A-0926  
FCC-ID: PVH0926  
WLAN MAC: 123456ABCDEF

*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and  
(2) this device must accept any interference received, including interference that may cause undesired operation.*



## WARNING

### Labelling internal battery GEB241, GEB242



004729\_001

*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*



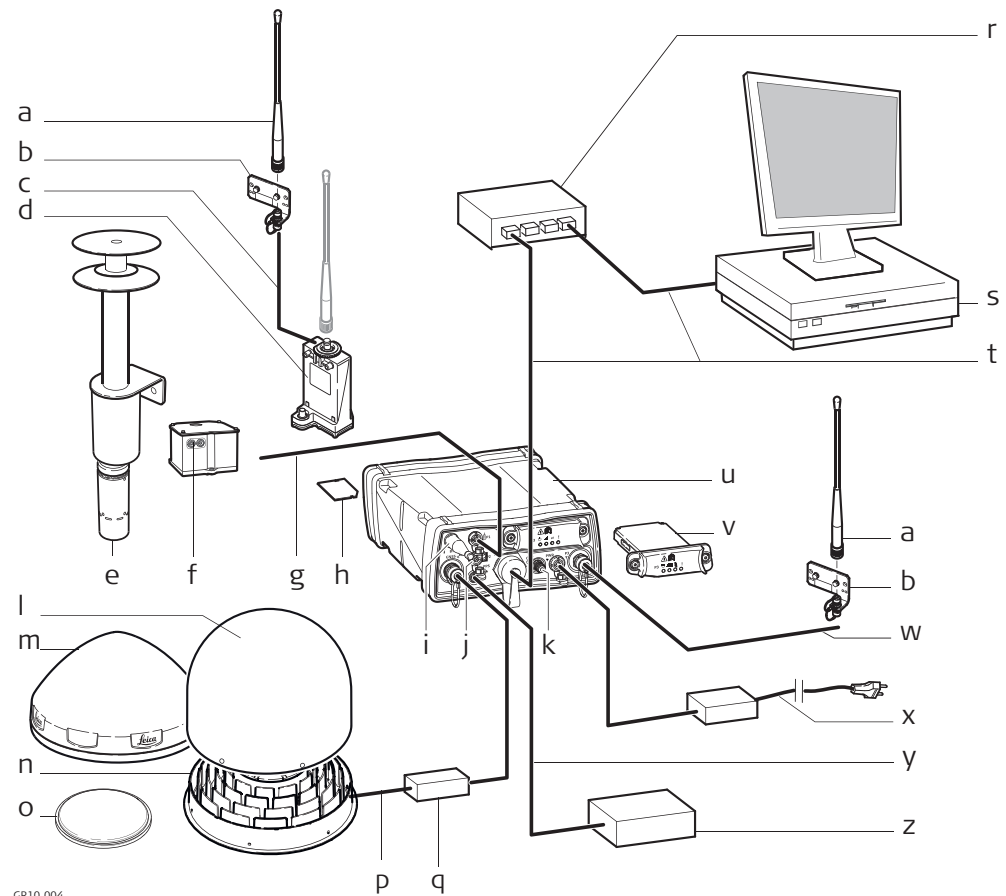
## 2 Description of the System

### 2.1 General Information

<b>Design</b>	<p>The instrument</p> <ul style="list-style-type: none"><li>• is designed for various permanent and semi-permanent reference station applications, including network RTK, single base station, scientific, campaign, monitoring and seismic studies.</li><li>• collects, stores and disseminates GNSS data.</li><li>• is highly suited to system integration.</li><li>• supports various external devices including communication, meteo and tilt.</li></ul>
<b>Satellite tracking</b>	<p>The instrument can track</p> <ul style="list-style-type: none"><li>• GPS L1/L2P(Y)/L2C/L5</li><li>• GLONASS L1/L2P/L2C</li><li>• Galileo E1/E5a/E5b/AltBOC</li><li>• BeiDou B1/B2</li><li>• QZSS L1/L2/L5</li><li>• SBAS L1</li></ul>
<b>Special features GR10/GR25</b>	<p>The instruments are equipped with several special features:</p> <ul style="list-style-type: none"><li>• 50 Hz data logging and streaming.</li><li>• SmartTrack+ measurement engine for higher accuracy and availability.</li><li>• Up to 12 multiple logging sessions and 20 data streams.</li><li>• Multiple data storage formats including MDB, RINEX and Hatanaka.</li><li>• Supports high capacity storage up to 32 GB and intelligent Smart clean-up.</li><li>• Multiple data output formats including Leica, Leica 4G, RTCM 2.x,3.x, LB2, BINEX, CMR, CMR+.</li><li>• Modern, user friendly Web interface GUI, available in different languages.</li><li>• Seamless integration with Leica GNSS Spider.</li><li>• Robust lightweight metal housing.</li><li>• Fully ruggedised to IP67, including a ruggedised Ethernet port.</li><li>• Simple mounting for IT rack, cabinet and wall mount. Unit is also stackable.</li><li>• Built in communications slot-in port.</li><li>• Integrated device management for external devices.</li><li>• Supports DHCP, DNS, DynDNS and mobile internet.</li><li>• NTRIP Server/Client/Caster</li><li>• Improved security including IP filtering, access management and HTTPS with custom SSL.</li><li>• Out of the box plug and play hostname setup.</li><li>• Wide supply voltage 10.5-28 V.</li><li>• Low-power consumption, with 3.0-3.5 W typical.</li><li>• External oscillator port</li><li>• USB client port</li></ul>
<b>Special features GR25 only</b>	<p>In addition, the GR25 instruments are equipped with several special features:</p> <ul style="list-style-type: none"><li>• Integrated display and keypad.</li><li>• Internal battery and charger.</li><li>• USB host port.</li><li>• Power over Ethernet.</li><li>• Bluetooth or WLAN.</li><li>• PPS and event port.</li></ul>

**Component overview**

The following diagram shows a variety of reference station setups and the most common accessories that can be used with a GR10/GR25.



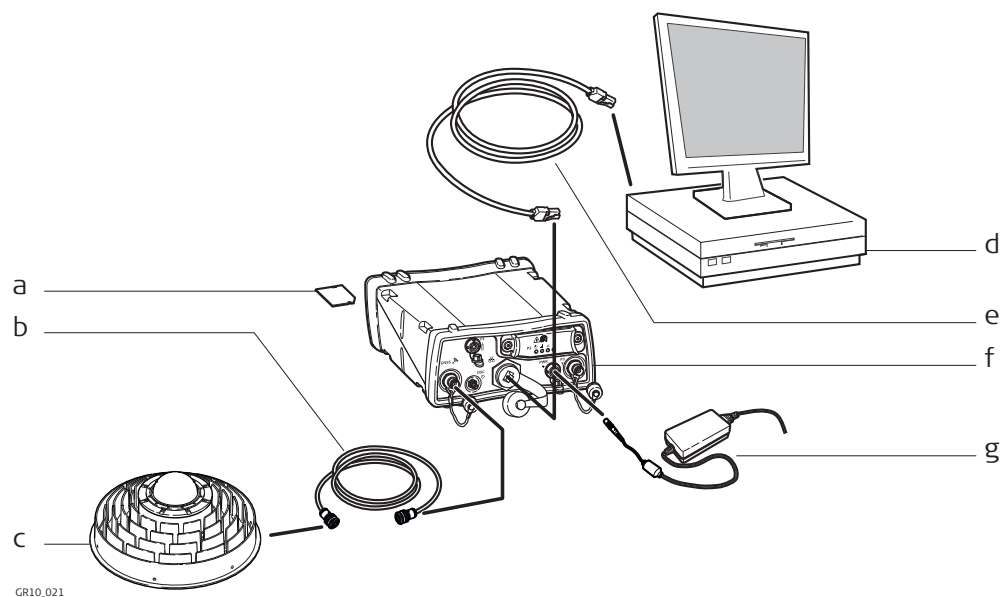
GR10\_004

- |                                       |  |
|---------------------------------------|--|
| a) Radio/GSM antenna                  | o) GNSS antenna, AS10                            |
| b) Antenna bracket                    | p) Antenna cable                                 |
| c) Antenna cable                      | q) Optional lightning protection                 |
| d) GFU housing incl. Radio/GSM device | r) Ethernet hub                                  |
| e) Meteo sensor                       | s) Computer running GNSS Spider or web interface |
| f) Tilt sensor                        | t) Ethernet cable                                |
| g) Serial cable                       | u) GR10/GR25                                     |
| h) SD card                            | v) Slot-in device                                |
| i) Bluetooth/WLAN antenna*            | w) Antenna cable                                 |
| j) Serial port 2/Event port*          | x) Power supply                                  |
| k) Connector for external oscillator  | y) PPS cable*                                    |
| l) Optional radome for AR20/AR25      | z) Device receiving electric pulse*              |
| m) GNSS antenna, AR10/AR20            |  |
| n) GNSS antenna, AR25                 |  |

\* GR25 only

Minimum setup components

The following diagram shows the minimum components required to operate a GR10/GR25.



- a) SD card\*
- b) Antenna cable
- c) GNSS Antenna
- d) Computer running Web interface or Leica GNSS Spider
- e) Ethernet or USB cable
- f) GR10/GR25
- g) Power supply

\* The instrument can be operated without the SD card but only data streaming will be possible.

Main components

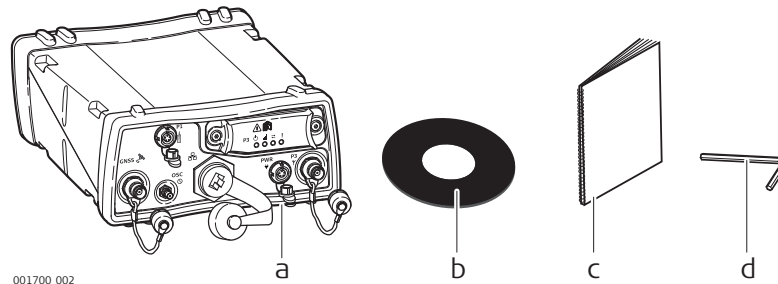
Component	Description
GR10/GR25	To provide the storage and streaming of raw satellite data.
Antenna	To receive the satellite signals from the GNSS (Global Navigation Satellite System) satellites
Web interface	Web-based tool to configure the GR Series instrument. ☞ The GR25 features a display and buttons which can be used for initial instrument setup or minor configuration changes in the field.
Leica GNSS Spider	The reference station office software including comprehensive instrument control and configuration, file download and firmware upload functions which support working with Leica GR Series instruments. Supports the connection to single or multiple reference instruments simultaneously.

## 2.3

## Unpacking the Instrument

### Delivery box

The minimum items delivered with the GR10/GR25 include:



- a) GR10/GR25
- b) CD
- c) GR10/GR25 Quick Guide
- d) Allen key (GR25 only)

### Accessories

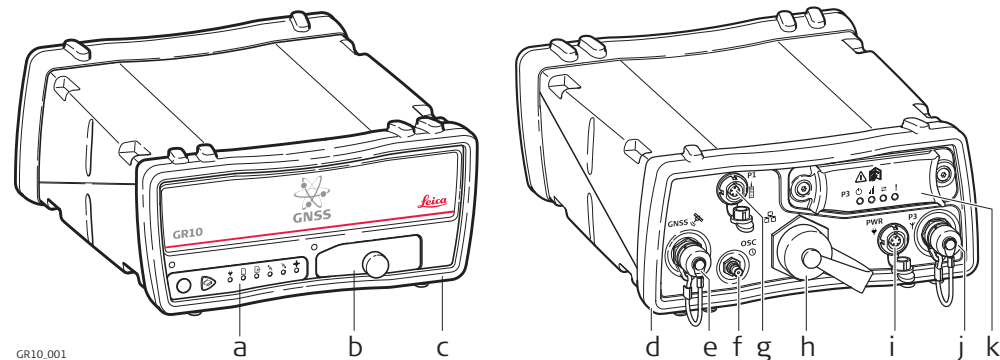
Additional equipment such as cables, antennas and power supply required for a complete reference station installation are delivered with the GR10/GR25 when ordered. For an overview of a typical reference station installation and the accessories that can be used with the instrument go to "Component overview".

For further information on accessories, please refer to the "GR Series Operational Manual (Online Help)".

## 2.4

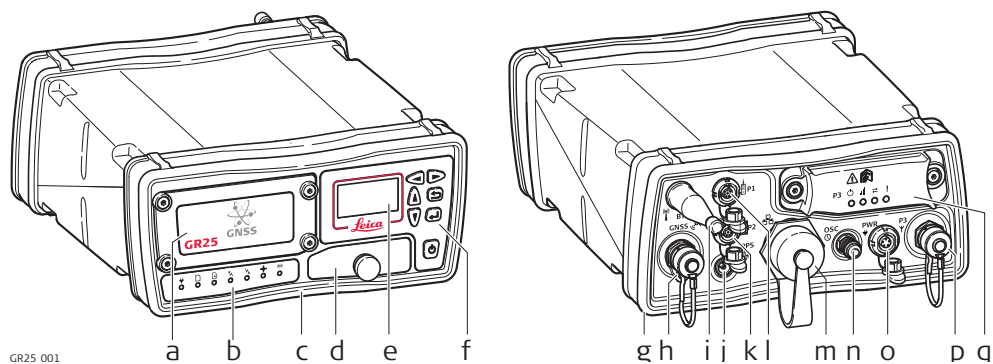
## Instrument Components

### GR10 components



- a) User interface
- b) USB and SD card cover
- c) Front rubber bumper
- d) Back rubber bumper
- e) GNSS Antenna port
- f) External Oscillator port
- g) Serial port (P1)
- h) Ruggedised Ethernet port
- i) Power port
- j) Communication Slot-in port Antenna (P3)
- k) Communication Slot-in port (P3)

## GR25 components



- a) Battery cover
- b) LED's
- c) Front rubber bumper
- d) USB and SD card cover
- e) Display
- f) Buttons
- g) Back rubber bumper
- h) GNSS Antenna port
- i) Bluetooth/WLAN Antenna
- j) PPS port
- k) Serial and Event in port (P2)
- l) Serial port (P1)
- m) Ruggedised Ethernet port
- n) External oscillator port
- o) Power port
- p) Communication Slot-in port Antenna (P3)
- q) Communication Slot-in port (P3)

**Overview**

The GR Series instrument can be operated by:

- pressing its buttons
- the web interface
- Leica GNSS Spider software
- or with the Leica Binary 2 (LB2) interface. Contact your Leica Geosystems representative for information on LB2 documentation.



The instrument is delivered with default settings which cover the needs of the typical user. Use the Web interface or Leica GNSS Spider to adjust the instrument settings.

**Operation by Web interface**

The Web interface is the main component used to configure and operate the instrument.

Refer to the "GR Series Operational Manual (Online Help)" for a detailed description of the Web Interface.

**Supported operating systems for Web interface setup over USB**

- Windows XP SP2 and SP3 (32 bit)
- Windows Vista SP2 (32 bit)
- Windows Server 2008 SP1 (64 bit)
- Windows 7 (32 bit and 64 bit)
- Windows 8 (32 bit and 64 bit)

**Supported web browsers for the Web interface**

All current versions of the following web browsers are supported and tested:

- Internet Explorer
- Firefox
- Chrome

Other web browsers, such as Opera or Safari, can work but are not regularly tested for compatibility.



The Web interface is the primary interface between the user and the instrument. To use the Web interface correctly make sure that the Web browser allows JavaScript to be run. Check the web browsers settings if you have problems using the Web interface.

**Web interface security**

When accessing the Web interface for the first time use the default **User name** (Admin) and **Password** (12345678).



For security reasons, it is recommended to create a new administrator account when logging in for the first time. After creating the new administrator, log out and relogin with the new user credentials. The default user account can then be deleted. Refer to the "GR Series Operational Manual (Online Help)" for a step-by-step guide.

## Operation by Leica GNSS Spider

The reference station software Leica GNSS Spider provides comprehensive instrument functionality, like the Web interface.



Some configuration settings are available both in the Web interface and in Leica GNSS Spider. If such settings are configured in the Web interface, and then an **Upload Settings** or **Start** is done from Leica GNSS Spider, the settings are overwritten. In this case use the Web interface exclusively for settings that are not available in Leica GNSS Spider.

To operate Leica GNSS Spider, refer to the

- "GR Series Operational Manual (Online Help)" for basic information.
- "Leica GNSS Spider Online Help" for advanced information.

### Requirement

- GR10: Leica GNSS Spider v4.0 or later must be installed.
- GR25: Leica GNSS Spider v4.2 or later must be installed.



The version requirement applies to active instrument connections to configure the instrument by Leica GNSS Spider. It does not apply to passive connections for data streaming only.

## GNSS Spider features

GNSS Spider features:

- Simultaneous configuration and communication with one or many instruments.
- Monitoring and messaging on instrument key parameters such as power voltage level, data storage availability, instruments internal temperature or events logged on the instrument.
- Visualisation of satellite tracking status.
- Transfer of raw data automatically from the instrument to a central data storage.
- Perform RINEX conversion manually or automatically at different decimation rates and file lengths.
- FTP push archived data to multiple locations.
- Perform automatic quality control of archived RINEX data.
- Manage an entire network of reference stations.
- Supply single base or network RTK corrections to many users using various communication methods, including for example, Ntrip .
- Protect and manage access to RTK correction services using the Spider Business Center advanced user access management.

## Connecting the GR10/GR25 to Leica GNSS Spider:

Connect to Leica GNSS Spider in the following ways:

- TCP/IP Ethernet over LAN, WAN, WLAN or Internet
- TCP/IP Mobile Internet using GPRS, EDGE or UMTS
- USB client connection to a PC/Laptop
- RS232 Lemo serial connection to a PC/Laptop



For TCP/IP connections, both Active and Passive connections are supported by direct TCP/IP. Active and Passive connections to Leica GNSS Spider are also supported using NTRIP with GR10/GR25 firmware v2.5 onwards. Bluetooth connections to Leica GNSS Spider are also possible, but not recommended.

**Description** All instruments use the same software concept.

**GR Series software**

Software type	Description
GR firmware (GR10_x.xx.xxx.fw/.zip) (GR25_x.xx.xxx.fw/.zip)	<p>The GR Series firmware is called RefWorx. This important system software covers the basic functions of the instrument.</p> <p>The onboard Web interface is integrated into the firmware and cannot be deleted.</p> <p>The English language is integrated into the firmware and cannot be deleted.</p>
Language software (REF_LANG.sxx)	<p>Numerous languages are available for the instrument web server. Language software is also referred to as system language.</p> <p>The system software enables a maximum of three languages which can be stored at any one time - the English language and two other languages. The English language is the default language and cannot be deleted. One language is chosen as the active language.</p>

**Software upload**

Software for	Description
All GR models	<p>All software is stored in the System RAM of the instrument.</p> <p>A new firmware file must be uploaded to the SD card before installation. The file can be uploaded via:</p> <ul style="list-style-type: none"> <li>the Web interface.</li> <li>direct copy to the SD card using a computer.</li> <li>direct FTP access to the SD card.</li> </ul> <p>After uploading, the firmware must be transferred from the SD card to the System RAM via the Web interface. Refer to the "GR Series Operational Manual (Online Help)" for further information.</p> <p>Leica GNSS Spider can also be used to install the firmware. Loading the firmware to the SD card and installing it on the instrument is done in one step when using GNSS Spider. Refer to the "Leica GNSS Spider Online Help" for more information.</p>

**General**

Use the Leica Geosystems power supplies, batteries, chargers and accessories or accessories recommended by Leica Geosystems to ensure the correct functionality of the instrument.

**Power options**

Power for the instrument can be supplied either by power supply or batteries. Up to two external power supplies can be connected using a Y-cable.

Internal power supply: For the GR25 only, GEB241 (754834) battery or GEB242 (793975) battery for internal power supply. Battery can be charged from an external power source.



External power supply: GEV242 (774437), 110 V/240 V AC to 24 V DC power supply unit, supplied by Leica Geosystems.  
OR  
GEV251 (722409) 110 V/240 V AC to 12 V DC power supply unit, supplied by Leica Geosystems.  
OR  
GEB171 (439038) battery connected via a cable.  
OR  
Car battery connected via a converter cable supplied by Leica Geosystems.  
OR  
For GR25 only, Power over Ethernet via a category 5 Ethernet cable or higher to supply 13W of power over Ethernet.

Y-cable: GEV243 (774438), Y-cable can be used with GEV242 power supply and GEB171 battery or the existing 12 V power supply (722409). The black Lemo connector on this cable only supports the use of the GEV242 power supply.  
OR  
GEV172 (733298), Y-cable can be used with any combination of 110 V/240 V AC to 12 V DC power supply (722409) or a GEB171 battery.



When using the GR10 for permanent operations use **Uninterruptible Power Supply** units as a back-up in a main power failure.

The GR25 has a built-in battery and charger that can act as a short term **Uninterruptible Power Supply**. For long-term protection against power failure, an external **Uninterruptible Power Supply** can also be used.

<b>Installation location</b>	<p>It is recommended that the instrument is installed so that it is</p> <ul style="list-style-type: none"> <li>• protected from mechanical influences and lightning</li> <li>• within 70 m of the antenna, without the need to use inline amplifiers.</li> <li>• located sufficiently far enough away from potential sources of radio frequency interference. High-power signals from nearby radio, radar or GSM/GPRS/UMTS cell towers can cause problems with GNSS tracking. Such interference is not harmful to the instrument but could cause a loss of GNSS data.</li> </ul>
<b>Installation orientation</b>	<ul style="list-style-type: none"> <li>• For inside assembly, the instrument can be installed in any direction</li> <li>• When installing the instrument outside, orientate the instrument vertically so that the connector points are pointing downwards</li> </ul>
<b>Cable installation</b>	<p>Ensure that the cables between the instrument and antenna are positioned to prevent them from becoming bent, stretched or squeezed. For the installation of the cables, the general rules for the installation of electrical wiring apply.</p>
	<p>Please consider that a well-planned and thoroughly carried out electric installation not only protects the cables against damage, but also looks professional.</p>
	<p>For detailed installation information, refer to the "GNSS Reference Station and Networks - An Introductory Guide".</p>
<b>Using the wireless slot in device port</b>	<p>When using the wireless slot in device port with any slot in radio/GSM/3G/CDMA module it is recommended to use an antenna extension cable and mounting bracket to correctly position the antenna vertically, and away from the Bluetooth/WLAN antenna, as shown in the following installation options.</p>

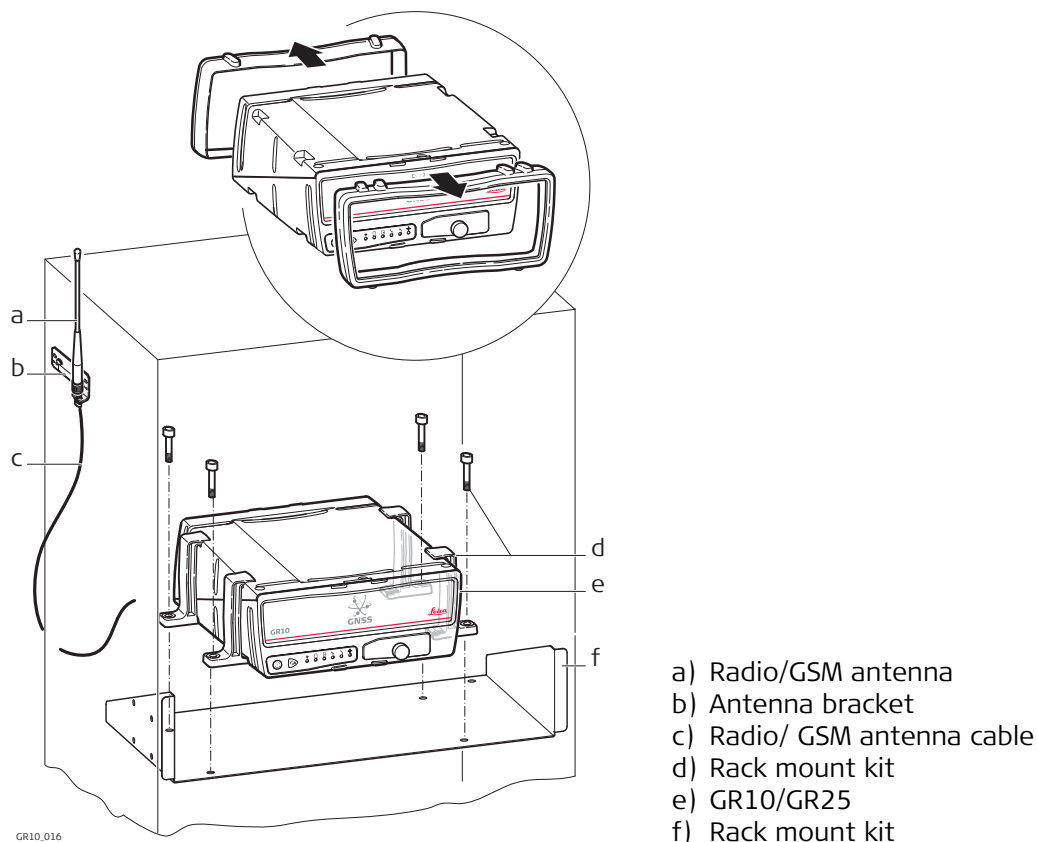
**Description**

GR Series instruments are designed for various installation cases. Below is a short description of four installation cases for the instrument. Please note that the diagrams do not show all the equipment required for a complete reference station installation. For full installation details, please refer to the

- GNSS Reference Station and Networks - An Introductory Guide.
- GNSS Networks and Reference Stations Equipment List

**Rack Mount**

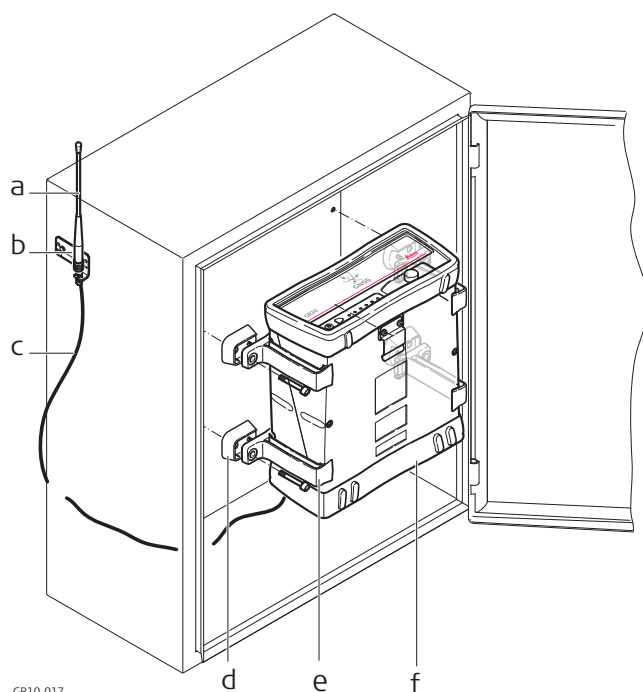
Together with the rack mount accessory kit the instrument can be easily mounted into a standard 19 inch IT rack.



- ☞ If space in the rack is limited, then the rubber bumpers on the instrument can be removed. The total height of the rack kit and instrument is then 2U. If the bumpers are removed, please remove the small feet from the mounting brackets.
- ☞ The radio/GSM antenna must be installed on the outside of the rack if a slot-in or serial device is used.

## Wall / Cabinet Mount

Together with the wall mount accessory kit the instrument can be easily mounted onto an existing wall or structure, or inside an environmental case.

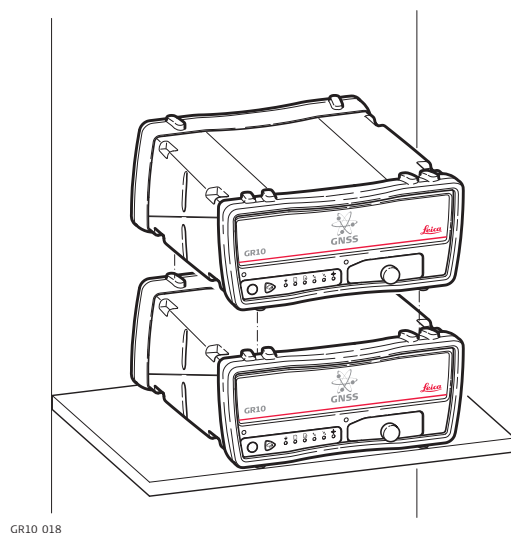


- a) Radio/GSM antenna
- b) Antenna bracket
- c) Radio/GSM antenna cable
- d) Wall mount kit - feet
- e) Wall mount kit - bracket
- f) Rubber bumper

- ✎ If space in the cabinet is limited, then the rubber bumpers on the instrument can be removed. If the bumpers are removed, please remove the small feet from the mounting brackets.
- ✎ The radio/GSM antenna must be installed on the outside of the rack if a slot-in or serial device is used.

## Free Standing / Stacking

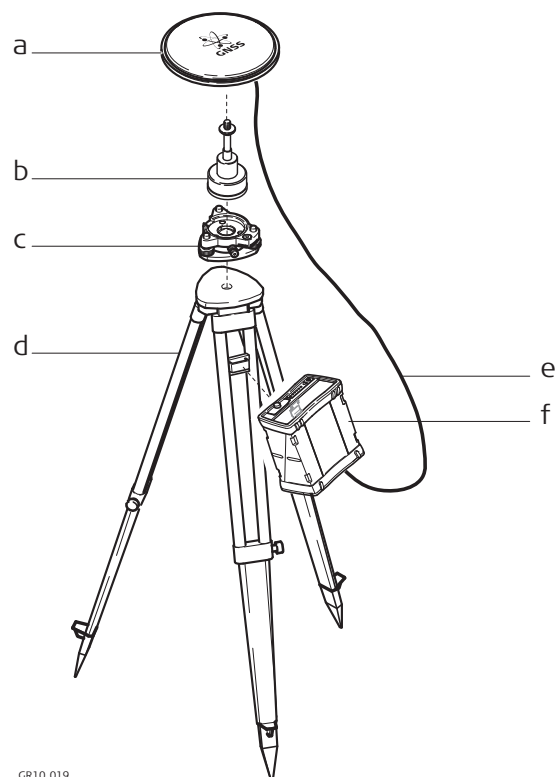
The instrument is designed to allow stable free standing installation and stacking for easy configuration of multiple receivers.



- ✎ When stacking multiple instruments on top of each other, the rubber bumpers must be on.

## Tripod

The instrument has a built-in Tripod mount to allow attachment to all Leica Geosystems Tripods.



- a) AR10/AS10(shown)
- b) GNSS antenna carrier with 5/8 inch screw
- c) Tribrach
- d) Tripod
- e) Antenna cable
- f) GR10/GR25



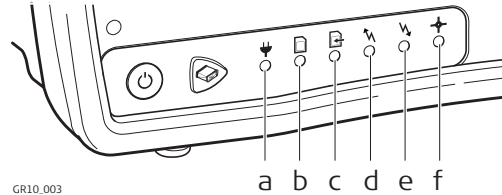
When using the instrument on a tripod, the rubber bumpers must be on.

## LED indicators

## Description

The GR10 has Light Emitting Diode indicators. They indicate the basic instrument status.

## Diagram




GR10\_003

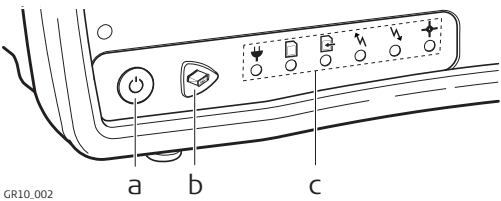
- a) Power LED
- b) SD card LED
- c) Raw data logging LED
- d) RT out data stream LED
- e) RT in data stream LED
- f) Position LED

## Description of the LED's


IF the	is	THEN
Power LED ⏻	off	The instrument is turned off.
	green	The instrument is turned on.
SD card LED 💾	off	No SD card inserted or power is off.
	green	SD card is inserted. The free space on the SD card is greater than 20%.
	yellow	The free space on the SD card is below 20%. 👉 <b>Recommended user action:</b> Activate the Smart clean-up or the automatic file delete for each logging session.
	red	SD card is full. Data logging has stopped. 👉 <b>Recommended user action:</b> Immediately activate the Smart clean-up or the automatic file delete for each logging session.
Raw data logging LED 📁	off	No active logging sessions or power is off.
	green	Active logging sessions are configured on the instrument and data is being logged
	yellow	Active logging sessions are configured and Smart clean-up is deleting data from all or some of the configured logging sessions. OR Active logging sessions are configured but no position is available. 👉 <b>Recommended user action:</b> Check the remaining space of the SD card and delete old data if necessary. Check the tracking and position status.
	red	Active logging sessions are configured but the SD card is full or no satellites are tracked. 👉 <b>Recommended user action:</b> Check the SD card and the tracking status.

IF the	is	THEN
RT out data stream LED ↗	off	No active data stream is configured or power is off.
	green	One or more data streams are configured and active. Data is being streamed.
	red	Data streams are active but no data is streamed.  <b>Recommended user action:</b> Check that data is tracked and a navigated position is available. Check that the correct reference position is entered.
RT in data stream LED ↘	off	No active real time in data stream or power is off.
	green	A real time in data stream is configured and active, data is received and a fixed position is available.
	flashing green	A real time in data stream is configured and active, data is received and a DGPS position is available.
	yellow	A real time in data stream is configured and active, data is received but no fixed or DGPS position is available.
	red	Incoming data streams are active but no data is received. OR Incoming data stream is configured and active but the instrument is not tracking satellites and/or no navigated position is available. <b>Recommended user action:</b> Check that the incoming data connection is set up correctly. Check the tracking and position of the instrument.
Position LED ✚	off	The instrument is switched off.
	flashing green	The instrument is tracking satellites but no position is available.
	green	A navigated position is available.
	red	No satellites are tracked and no navigated position is available.


GR10 Keyboard




- a) ON/OFF button
- b) Function button
- c) LED's

 The instrument can be turned on and off by holding down the ON/OFF button for 2 s. A green steady light at the power LED indicates that the instrument is turned on and ready.


ON/OFF button

Button	Function
ON/OFF 	If GR10 already off: Turns on GR10 when held for 2 s.  If GR10 already on: Turns off GR10 when held for 2 s.











 Hold the ON/OFF button for 10 s, to force the instrument to turn off. Instrument settings and some data can be lost when using this method.








Function button

 All the following functions described assume the GR10 is already on.

Button	Function
Function 	The Function and ON/OFF button work in combination and allow a number different functions as described in "Button combinations".  The Function button switches between these different functions.

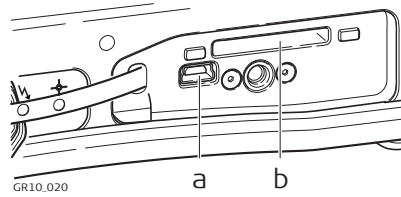
## Button combinations

Buttons	How to
 + 	<b>Activate dual button functionality</b>  Press and hold both buttons until all LEDs are flashing. After 1 s, the  Raw data logging LED starts flashing. The following instrument commands are now activated.
 3 s	<b>Start/Stop all logging sessions</b>  Activate the dual button functionality.  If all logging sessions had been off, the Raw data logging LED is flashing green. <ul style="list-style-type: none"> <li>Press the Function button until the LED flashes quickly to START all configured logging sessions if the Raw data logging LED is flashing green.</li> </ul> OR If any logging session had been active, the Raw data logging LED is flashing red. <ul style="list-style-type: none"> <li>Press the Function button until the LED flashes quickly to STOP all active logging sessions if the Raw data logging LED is flashing red.</li> </ul> After logging has been started or stopped, the LED and instrument functionality goes back to general behaviour.
 1 X   3 s	<b>Start/Stop all data streams</b>  Activate the dual button functionality. Press the Function button until the  RT out data streams LED starts flashing slowly. If all data streams had been off, the RT out data stream LED is flashing green. <ul style="list-style-type: none"> <li>Press the Function button until the LED flashes quickly to START all configured data streams if the RT out data stream LED is flashing green.</li> </ul> If any data stream had been active, the RT out data stream LED is flashing red.           OR <ul style="list-style-type: none"> <li>Press the Function button until the LED flashes quickly to STOP all active data streams if the RT out data stream LED is flashing red.</li> </ul> After data streams have been started or stopped, the LED and instrument functionality goes back to general behaviour.
 2 X   3 s	<b>Initialise the measurement engine</b>  Activate the dual button functionality. Press the Function button until the  Position LED starts flashing slowly. <ul style="list-style-type: none"> <li>Press the Function button until the LED flashes quickly to reset the measurement engine. This action will delete all almanac and ephemeris information and the instrument will take a few minutes to restart tracking satellites.</li> </ul> After the measurement engine has been initialised, the LED and instrument functionality goes back to general behaviour.

Buttons	How to
<div data-bbox="422 254 470 300"></div> <div data-bbox="603 254 651 279">3 X</div> <div data-bbox="422 331 470 378"></div> <div data-bbox="603 331 651 357">3 s</div>	<p><b>Format receiver settings</b></p> <p>Activate the dual button functionality.</p> <p>Press the Function button until the  Power LED starts flashing slowly:</p> <ul style="list-style-type: none"> <li>Press the Function button until the LED flashes quickly to set all configured instrument settings back to factory default values.</li> </ul> <p>After the system format is completed, the LED and instrument functionality goes back to general behaviour.</p>
<div data-bbox="422 621 470 667"></div> <div data-bbox="603 621 651 646">4 X</div> <div data-bbox="422 699 470 745"></div> <div data-bbox="603 699 651 724">3 s</div>	<p><b>Format the SD card</b></p> <p>Activate the dual button functionality.</p> <p>Press the Function button until the  SD card LED starts flashing slowly:</p> <ul style="list-style-type: none"> <li>Press the Function button until the LED flashes quickly to format the SD card.</li> </ul> <p>After the SD card format is completed, the LED and instrument functionality goes back to general behaviour.</p>
<div data-bbox="422 989 470 1035"></div> <div data-bbox="603 989 651 1014">5 X</div>	<p><b>Exit combined button functionality</b></p> <ul style="list-style-type: none"> <li>Use the buttons functionality as described above.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>To return to normal instrument functionality, press the Function button until all LEDs stop flashing.</li> </ul>

**USB port and SD card slot****Description**

The GR10 has a USB port and an SD card slot.

**Diagram**

- a) USB client port  
b) SD card slot

**USB client port**

The USB client port can be used to:

- connect the GR10 to a computer and access the GR10 Web interface and FTP server.
- connect the GR10 to a CS10/CS15 field controller and access the GR10 Web interface.

**SD card slot**

Data is stored on a removeable SD card.

For more information on how to work with the SD card, refer to "7.3 Working with the Memory Device"



If no SD card is inserted, data storage is not possible.



Unplugging connection cables or removing the SD card during data logging or streaming can cause loss of data. Switch off the instrument before removing the SD card.



While other SD cards can be used, Leica Geosystems recommends only using Leica SD cards. Leica Geosystems is not responsible for data loss or any other error that can occur while using a non-Leica card.



SD cards can directly be used in the Leica USB Card Reader (767895 MCR7). Other computer card drivers can require an adaptor.



If formatting the SD card is necessary, we highly recommend to format the SD card on the instrument. Refer to the GR Series Operational Manual (Online Help) for detailed instructions.

**SD card capacity**

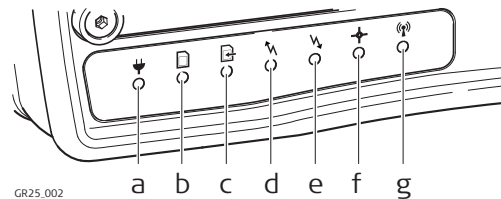
Maximum supported capacity: 32 GB.

## LED indicators

## Description

The GR25 has Light Emitting Diode indicators. They indicate the basic instrument status.









## Diagram








- a) Power LED
- b) SD card LED
- c) Raw data logging LED
- d) RT out data stream LED
- e) RT in data stream LED
- f) Position LED
- g) Bluetooth LED

## Description of the LED's

IF the	is	THEN
Power LED ⚡	off	The instrument is turned off.
	green	The instrument is turned on.
	flashing green	The instrument is on but has switched to a backup power source. If an internal battery is used, indicates that the remaining battery capacity is high.
	yellow	Only shown if using an internal battery. The remaining battery capacity is low. 👉 <b>Recommended user action:</b> Provide an alternative power source.
	red	Only shown if using an internal battery. The remaining battery capacity is critical. 👉 <b>Recommended user action:</b> Switch to a new power source immediately.
	flashing yellow	The internal battery is charging. 👉 Charging is only indicated by LEDs when the instrument is turned off. When the instrument is on, the LEDs indicate the current power level.
	flashing red	Charging of the internal battery is activated but there is an error in charging the battery. 👉 <b>Recommended user action:</b> Check and reattach the battery. If the problem does not disappear, please send the battery to Leica Geosystems Service. 👉 Charging is only indicated via LEDs when the instrument is turned off. When the instrument is on, the LEDs indicate the current power level.

IF the	is	THEN
SD card LED 	off	No SD card inserted or power is off.
	green	SD card is inserted. The free space on the SD card is greater than 20%.
	yellow	The free space on the SD card is below 20%.  <b>Recommended user action:</b> Activate the Smart clean-up or the automatic file delete for each logging session.
	flashing green	Use of external USB drive is configured but the device is not available. Data is written to the SD card. The free space on the SD card is greater than 20%.
	flashing yellow	Use of external USB drive is configured but the device is not available. Data is written to the SD card. The free space on the SD card is below 20%.
	red	SD card is full. Data logging has stopped.  <b>Recommended user action:</b> Immediately activate the Smart clean-up or the automatic file delete for each logging session.
Raw data logging LED 	off	No active logging sessions or power is off.
	green	Active logging sessions are configured on the instrument and data is being logged
	yellow	Active logging sessions are configured and Smart clean-up is deleting data from all or some of the configured logging sessions. OR Active logging sessions are configured but no position is available.  <b>Recommended user action:</b> Check the remaining space of the SD card and delete old data if necessary. Check the tracking and position status.
	red	Active logging sessions are configured but the SD card is full or no satellites are tracked.  <b>Recommended user action:</b> Check the SD card and the tracking status.
RT out data stream LED 	off	No active data stream is configured or power is off.
	green	One or more data streams are configured and active. Data is being streamed.
	red	Data streams are active but no data is streamed.  <b>Recommended user action:</b> Check that data is tracked and a navigated position is available. Check that the correct reference position is entered.

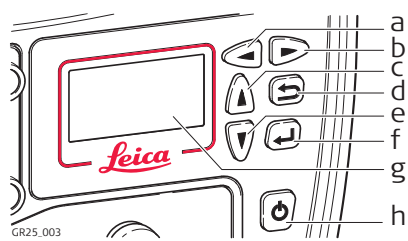
IF the	is	THEN
RT in data stream LED 	off	No active real-time in data stream or power is off.
	green	A real-time in data stream is configured and active, data is received and a fixed position is available.
	flashing green	A real-time in data stream is configured and active, data is received, a DGPS position is available.
	yellow	A real-time in data stream is configured and active, data is received but no fixed or DGPS position is available.
	red	Incoming data streams are active but no data is received. OR Incoming data stream is configured and active but the instrument is not tracking satellites and/or no position is available.  <b>Recommended user action:</b> Check that the incoming data connection is set up correctly. Check the tracking and position of the instrument.
Position LED 	off	The instrument is switched off.
	flashing green	The instrument is tracking satellites but no position is available.
	green	A navigated position is available.
	red	No satellites are tracked and no navigated position is available.
Bluetooth LED 	off	No Bluetooth wireless signal (not configured or no connection established).
	blue	Bluetooth connection configured and connected.

 Please note the Bluetooth LED is only available on GR25 Bluetooth enabled versions. GR25 with WLAN do not support Bluetooth.


5.2

Keyboard and Display


GR25 Keyboard and display




- a) Left button
- b) Right button
- c) Up button
- d) Cancel button
- e) Down button
- f) Enter button
- g) Display
- h) ON/OFF button



 The instrument can be turned on and off by holding down the ON/OFF button for 3 s. A green steady light at the power LED indicates that the instrument is turned on and ready.

ON/OFF button


Button	Function
ON/OFF 	If GR25 is already off: Turns on GR25 when held for 3 s.  If GR25 is already on: Turns off GR25 when held for 3 s.

 Hold the ON/OFF button for 10 s, to force the instrument to turn off. Instrument settings and some data can be lost when using this method.


Arrow buttons

Button	Function
Left/Right 	To scroll through menus and configuration options. For editable fields use the arrow buttons for scrolling and selecting alphanumeric fields.
Up/Down 	

Cancel button

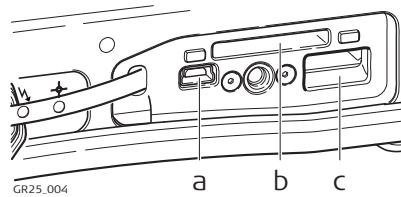
Button	Function
Cancel 	To exit pages without storing changes.

Enter button

Button	Function
Enter 	To select menu items, open new pages and select options.

**USB port and SD card slot****Description**

The GR25 has a USB host port, USB client port and an SD card slot.

**Diagram**

- a) USB client port
- b) SD card slot
- c) USB host port

**USB client port**

The USB client port can be used to:

- connect the GR25 to a computer and access the Web interface and FTP server.
- connect the GR25 to a CS10/CS15 field controller and access the Web interface.

**USB host port**

The USB host port can be used to:

- connect a USB mass storage device to the GR25 and push MDB and RINEX data from the SD card.

**SD card slot**

Data is stored on a removeable SD card.

For more information on how to work with the SD card, refer to "7.3 Working with the Memory Device"



If no SD card is inserted, data storage is not possible.



Unplugging connection cables or removing the SD card during data logging or streaming can cause loss of data. Switch off the instrument before removing the SD card.



While other SD cards can be used, Leica Geosystems recommends only using Leica SD cards. Leica Geosystems is not responsible for data loss or any other error that can occur while using a non-Leica card.



SD cards can directly be used in the Leica USB Card Reader (767895 MCR7). Other computer card drivers can require an adaptor.



If formatting the SD card is necessary, we highly recommend to format the SD card on the instrument. Refer to the GR Series Operational Manual (Online Help) for detailed instructions.

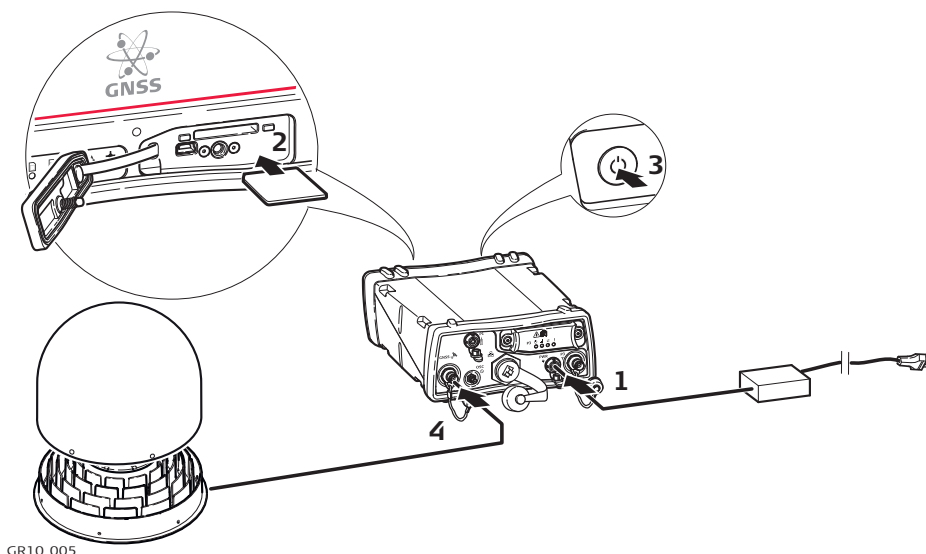
**SD card capacity**

Maximum supported capacity: 32 GB.


## 6 Equipment Setup

### 6.1 Basic Setup

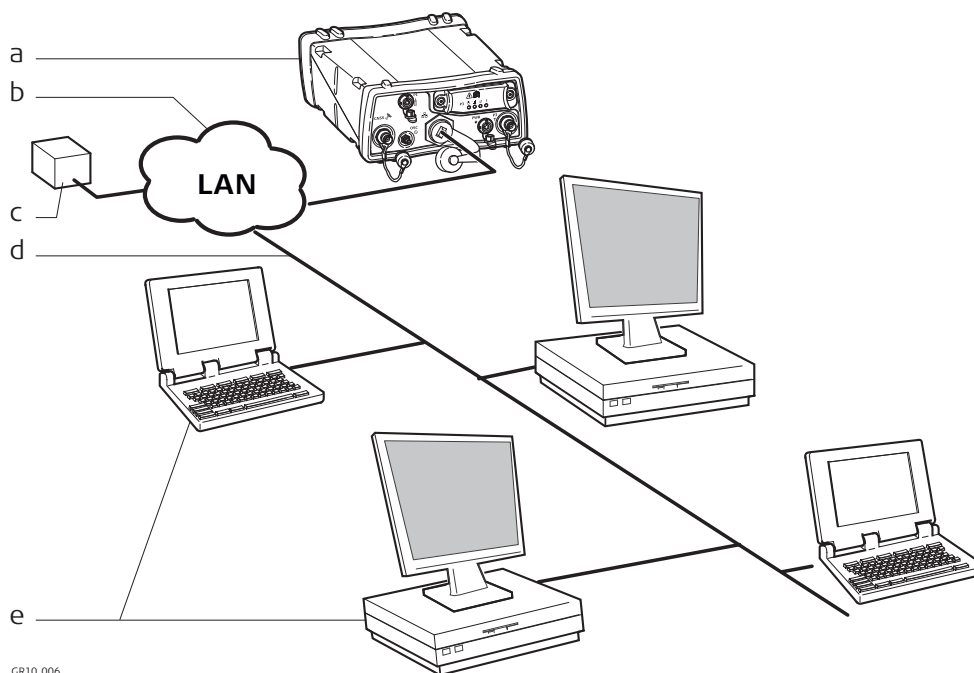
#### Description



GR10.005



Step	Description
1.	Plug the power cable/power supply into the GR10/GR25.
2.	Insert the SD card into the SD card slot. For more information on how to work with the SD card, refer to "7.3 Working with the Memory Device".
3.	Turn on the GR10/GR25.
4.	Attach the antenna cable, for example the GEV194, 1.8 m antenna cable, to the instrument's antenna port and to the connector on the antenna.
	<p>To access the instrument via Ethernet or USB refer to:</p> <ul style="list-style-type: none"> <li>"6.2 Setup via Web Interface over Ethernet and DHCP"</li> <li>"6.3 Setup in a Non-DHCP Network"</li> <li>"GR25 setup in a non-DHCP network using display and buttons"</li> <li>"6.4 Install USB drivers"</li> <li>"6.4.5 Setup via Web Interface over USB"</li> </ul> <p>Refer to the "GR Series Operational Manual (Online Help)" for detailed information on the Web interface.</p>

### Setup via Web Interface over Ethernet and DHCP



GR10\_006

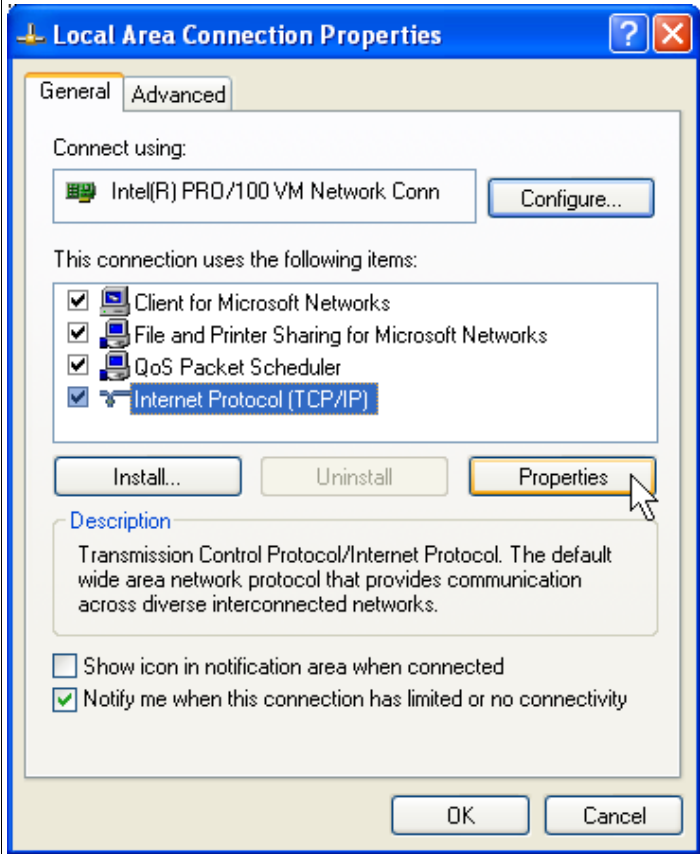
- a) GR10/GR25
- b) Local network (LAN)
- c) DHCP server
- d) Ethernet cable
- e) Computers with Web interface

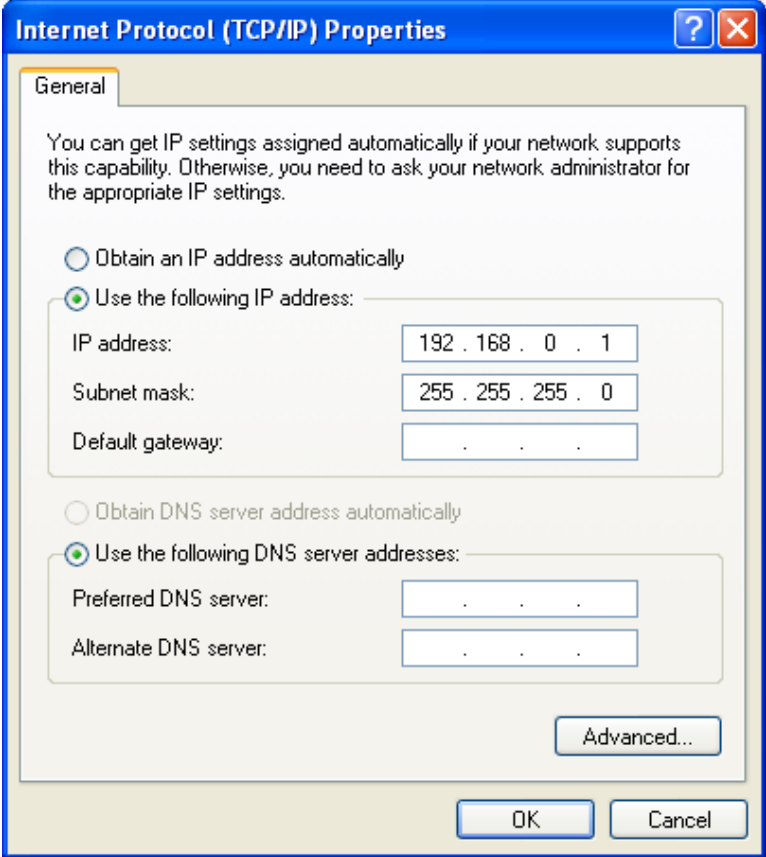

Step	Description
1.	Start the computer.
2.	To connect the instrument to the local LAN supporting DHCP, plug an Ethernet cable into the Ethernet port on the back of the GR10/GR25.
3.	Turn on the GR10/GR25.
4.	Open a browser window on your computer.
5.	Type "GR*****" into the browser's address field, where ***** is the serial number of the instrument. For example, GR1700001.
6.	The Web interface will now be accessible.
7.	Use the default <b>User name</b> (Admin) and <b>Password</b> (12345678).  After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR Series Operational Manual (Online Help) for a step-by-step guide.
8.	Configure the GR10/GR25 for all required settings.
	Refer to the GR Series Operational Manual (Online Help) for further details on using the instrument's Web interface.

### Setup in a non-DHCP network

If the instrument is setup in a non-DHCP network, the web interface can still be accessed using a crossed Ethernet cable.

#### Setup for Windows XP

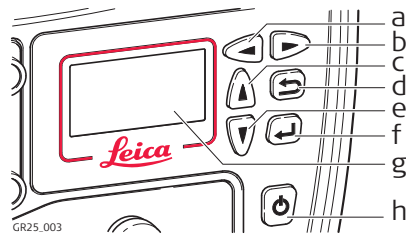
Step	Description
1.	Start the computer.
2.	Connect the crossed Ethernet cable to the computer and the Ethernet port on the back of the GR10/GR25.
3.	Turn on the GR10/GR25.
4.	On the computer go <b>Start / Control Panel / Network Connections</b> .
5.	Select the Network connection used with the crossed Ethernet cable, right click and select <b>Properties</b> .
	
6.	In the General tab, highlight <b>Internet Protocol</b> and press <b>Properties</b>

Step	Description
7.	<p>Select <b>Use the following IP address</b> and enter</p> <ul style="list-style-type: none"> <li>• <b>IP address:</b> 192.168.0.1</li> <li>• <b>Subnet mask:</b> 255.255.255.0</li> </ul> 
8.	Press OK.
9.	Open a browser window and enter 192.168.0.3 to open the Web interface.
	Per default, the GR10/GR25 instrument is configured to obtain an IP address automatically from a DHCP network. To use the default static IP address 192.168.0.3, reboot the GR10/GR25 once it is connected to the crossed Ethernet cable.

## GR25 setup in a non-DHCP network using display and buttons

In a field campaign the GR25 can be configured through the display and buttons, to start or stop pre-configured data streams and logging sessions.

For initial setup, the GR25 IT configuration for setup in a non-DHCP network can be done through the display and buttons.



- a) Left button
- b) Right button
- c) Up button
- d) Cancel button
- e) Down button
- f) Enter button
- g) Display
- h) ON/OFF button

Step	Description
1.	Turn on the GR25.
2.	Use the arrow buttons, go to <b>Configuration, Site Config</b> . Enter the coordinates, antenna type and site code.
3.	Press <b>Enter</b> to store all changes.
4.	Use the arrow buttons go to <b>Configuration, Network Config</b> . Enter the IP address, Subnet mask and gateway of the network to connect the instrument to.
5.	Press <b>Enter</b> to store all changes.
6.	For a field campaign setup, select <b>Logging/Streaming</b> and start or stop pre-configured data streams and logging sessions.
7.	Press <b>Enter</b> to store all changes.
8.	Refer to the "GR Series Operational Manual (Online Help) for further details on using the instrument.

## 6.4

### 6.4.1

## Install USB drivers

### General

#### Before you begin

Before connecting the instrument to a computer using a USB cable, you must first install USB drivers. To install the USB drivers refer to:

- "6.4.2 Install USB drivers for Windows XP operating systems".
- "6.4.3 Install USB drivers for Windows Vista operating systems".
- "6.4.4 Install USB drivers for Windows 7 operating systems".

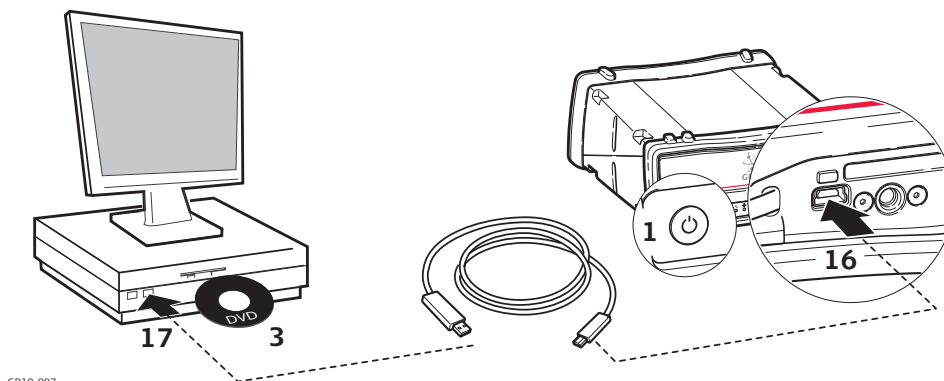


Only one instrument can be connected to the computer via USB at a time.

### 6.4.2






## Install USB drivers for Windows XP operating systems

#### Install USB drivers for Windows XP for the first time

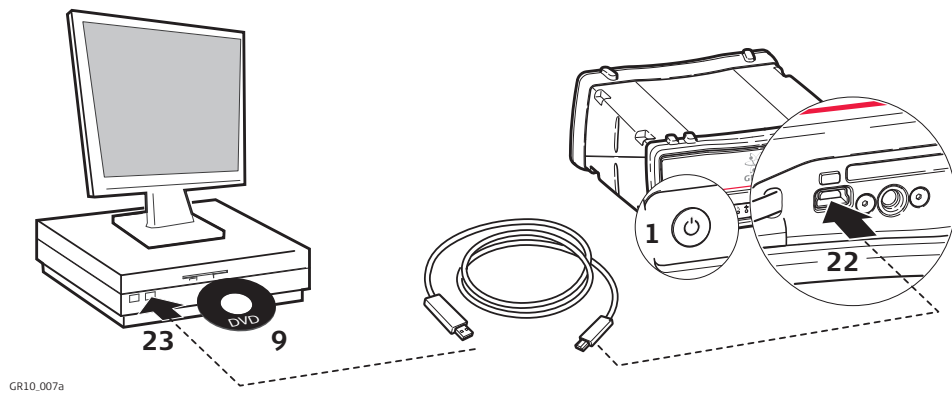



GR10\_007





Step	Description
1.	Turn on the instrument.
2.	Start the computer.
3.	Insert the Leica GR Series DVD.
4.	Run the installer executable depending on your CPU and operating system to install the drivers necessary for your instrument. a) 32 bit CPU: SetupViva&GR_USB_32bit.exe b) 64 bit CPU: SetupViva&GR_USB_64bit.exe c) Itanium 64 bit CPU: SetupViva&GR_USB_64bit_itanium.exe
5.	The <b>Welcome to InstallShield Wizard for Leica Viva &amp; GR USB drivers</b> window appears.
	Make sure all GR or Viva devices are disconnected from the computer.
6.	Click <b>Next&gt;</b> .
7.	The <b>Ready to Install the Program</b> window appears.
8.	Click <b>Install</b> . The drivers are installed on your computer.
9.	Click <b>Continue Anyway</b> every time a window pops up saying that the software has not passed the Windows Logo testing.
10.	The <b>InstallShield Wizard Completed</b> window appears.
11.	Read the instructions and check the box, <b>I have read the instructions</b> . These instructions are listed in detail in the following steps.
12.	Click <b>Finish</b> to exit the wizard.
13.	Click <b>Yes</b> to restart the system so all changes take effect. For Windows XP users with Service Pack 3: Windows does not require a restart.

Step	Description
14.	Loosen the screw on the SD card/USB port cover.
15.	Open the SD card/USB port cover.
16.	Plug the USB cable into the USB port on the instrument.
17.	Plug the USB cable into the USB port of the computer.
18.	Wait until the new hardware wizard starts up automatically. Select, <b>No, not this time</b> and click <b>Next&gt;</b> .  It can take some time for the wizard to start.
19.	Click <b>Next&gt;</b> to install the software automatically.
20.	Click <b>Continue Anyway</b> when a window pops up saying that this software has not passed the Windows Logo testing.
21.	Click <b>Finish</b> to exit the wizard.
22.	Another found new hardware wizard starts up automatically. Select, <b>No, not this time</b> and click <b>Next&gt;</b> .
23.	Click <b>Next&gt;</b> to install the software automatically.
24.	Click <b>Finish</b> to exit the wizard.  Windows will show <b>searching for IP address</b> . Ignore this and go to the next step.
25.	Run shortcut <b>Configure GR connection</b> which has been configured on the Windows desktop.  There are two more shortcuts created for the Leica GS and CS. These shortcuts can be ignored, unless these devices are needed on this computer. Refer to the GS or CS User Manual for further information.
26.	A DOS window is opened and a batch file is started to configure the IP settings for the RNDIS network adapter.
27.	Press any key to close the DOS window.
28.	Disconnect and reconnect the USB cable.
29.	Open a browser and type in the IP address: 192.168.254.2 to access the instruments Web interface.
30.	Use the default <b>User name</b> (Admin) and <b>Password</b> (12345678).  After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR Series Operational Manual (Online Help) for a step-by-step guide.
31.	Configure the instrument for all required settings.
	Please make sure that JavaScript is allowed to run on the web browser. Check the browser settings if you have problems using the Web interface.

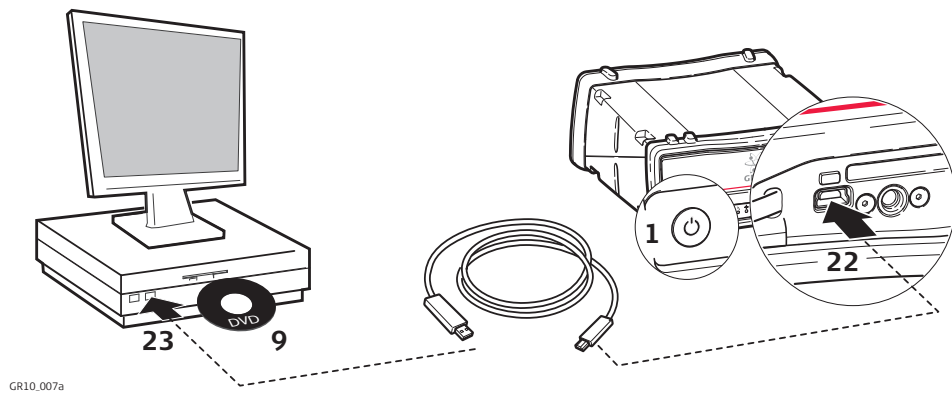
### Install USB drivers for Windows Vista for the first time



Step	Description
1.	Turn on the instrument.
2.	Start the computer.
3.	Disable the User Account Control before installing the drivers.
4.	Go to <b>Start</b> ⇒ <b>Control Panel</b> ⇒ <b>User Accounts and Family Safety</b> (or <b>User Accounts</b> , if you are connected to a network domain) ⇒ <b>User Accounts</b> .
5.	Select <b>Turn User Account Control on or off</b> .  Enter the computer administrators password if prompted.
6.	Disable the check box, <b>Use User Account Control (UAC) to help protect your computer</b> .
7.	Click <b>OK</b> .
8.	Restart the computer for all changes to take effect.
9.	Insert the Leica GR Series DVD.
10.	Run the installer executable depending on your CPU and operating system to install the drivers necessary for your instrument. a) 32 bit CPU: SetupViva&GR_USB_32bit.exe b) 64 bit CPU: SetupViva&GR_USB_64bit.exe c) Itanium 64 bit CPU: SetupViva&GR_USB_64bit_itanium.exe
11.	Wait until the <b>Mobile Device Center Driver Update</b> is finished.
12.	The <b>Welcome to InstallShield Wizard for Leica Viva &amp; GR USB drivers</b> window appears.
13.	Click <b>Next&gt;</b> .
14.	The <b>Ready to Install the Program</b> window appears.
15.	Click <b>Install</b> . The drivers are installed on your computer.
16.	Click <b>Install this driver software anyway</b> every time a window pops up saying that the software has not passed the Windows Logo testing.
17.	The <b>InstallShield Wizard Completed</b> window appears.
18.	Read the instructions and check the box, <b>I have read the instructions</b> . These instructions are listed in detail in the following steps.
19.	Click <b>Finish</b> to exit the wizard.
20.	Loosen the screw on the SD card/USB port cover.
21.	Open the SD card/USB port cover.
22.	Plug the USB cable into the USB port on the instrument.





Step	Description
23.	<p>Plug the USB cable into the USB port of the computer.</p> <p> Windows will show <b>searching for IP address</b>. Ignore this and go to the next step.</p>
24.	<p>Run shortcut <b>Configure GR connection</b> which has been configured on the Windows desktop.</p> <p> There are two more shortcuts created for the Leica GS and CS. These shortcuts can be ignored, unless these devices are needed on this computer. Refer to the GS or CS User Manual for further information.</p>
25.	A DOS window is opened and a batch file is started to configure the IP settings for the RNDIS network adapter.
26.	Press any key to close the DOS window.
27.	Disconnect and reconnect the USB cable.
28.	Open a browser and type in the IP address: 192.168.254.2 to access the instruments Web interface.
29.	<p>Use the default <b>User name</b> (Admin) and <b>Password</b> (12345678).</p> <p> After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR Series Operational Manual (Online Help) for a step-by-step guide.</p>
30.	Configure the instrument for all required settings.
	Please make sure that JavaScript is allowed to run on the web browser. Check the browser settings if you have problems using the Web interface.

### Install USB drivers for Windows 7 for the first time

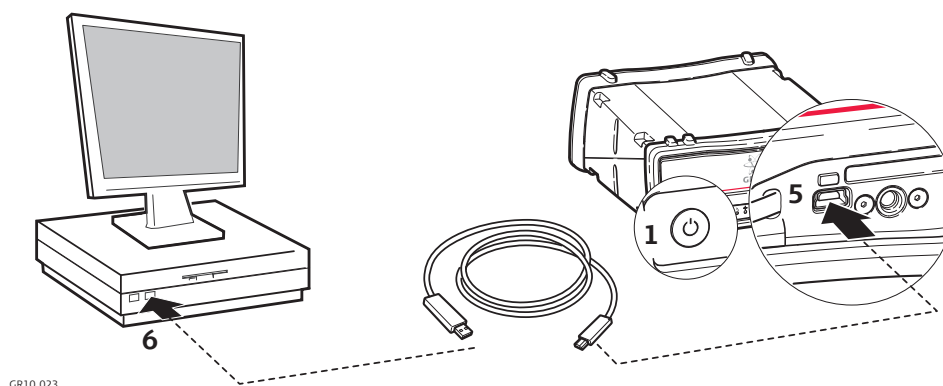



GR10\_007a

Step	Description
1.	Turn on the instrument.
2.	Start the computer.
3.	Disable the User Account Control before installing the drivers.
4.	Go to <b>Start</b> ⇒ <b>Control Panel</b> ⇒ <b>User Accounts and Family Safety</b> (or <b>User Accounts</b> , if you are connected to a network domain) ⇒ <b>User Accounts</b> .
5.	Go to <b>Change User Account Control</b> settings.
6.	Select level, <b>Never Notify</b> and click <b>OK</b> .
7.	When asked to allow the change, click <b>Yes</b> to confirm.
8.	Restart the computer for all changes to take effect.
9.	Insert the Leica GR Series DVD.
10.	Run the installer executable depending on your CPU and operating system to install the drivers necessary for your instrument. a) 32 bit CPU: SetupViva&GR_USB_32bit.exe b) 64 bit CPU: SetupViva&GR_USB_64bit.exe c) Itanium 64 bit CPU: SetupViva&GR_USB_64bit_itanium.exe
11.	Wait until the <b>Mobile Device Center Driver Update</b> is finished.
12.	The <b>Welcome to InstallShield Wizard for Leica Viva &amp; GR USB drivers</b> window appears.
13.	Click <b>Next&gt;</b> .
14.	The <b>Ready to Install the Program</b> window appears.
15.	Click <b>Install</b> . The drivers will be installed on your computer.
16.	Click <b>Install this driver software anyway</b> every time a window pops up saying that the software has not passed the Windows Logo testing.
17.	The <b>InstallShield Wizard Completed</b> window appears.
18.	Read the instructions and check the box, <b>I have read the instructions</b> . These instructions are listed in detail in the following steps.
19.	Click <b>Finish</b> to exit the wizard.
20.	Loosen the screw on the SD card/USB port cover.
21.	Open the SD card/USB port cover.
22.	Plug the USB cable into the USB port on the instrument.

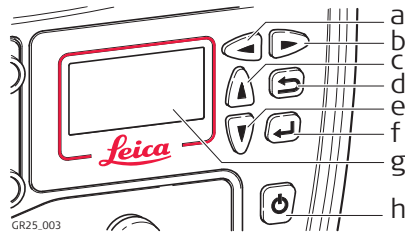
Step	Description
23.	<p>Plug the USB cable into the USB port of the computer.</p> <p> Windows will show <b>searching for IP address</b>. Ignore this and go to the next step.</p>
24.	<p>Run shortcut <b>Configure GR connection</b> which has been configured on the Windows desktop.</p> <p> There are two more shortcuts created for the Leica GS and CS. These shortcuts can be ignored, unless these devices are needed on this computer. Refer to the GS or CS User Manual for further information.</p>
25.	A DOS window is opened and a batch file is started to configure the IP settings for the RNDIS network adapter.
26.	Press any key to close the DOS window.
27.	Disconnect and reconnect the USB cable.
28.	Open a browser and type in the IP address: 192.168.254.2 to access the instruments Web interface.
29.	<p>Use the default <b>User name</b> (Admin) and <b>Password</b> (12345678).</p> <p> After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR Series Operational Manual (Online Help) for a step-by-step guide.</p>
30.	Configure the instrument for all required settings.
	Please make sure that JavaScript is allowed to run on the web browser. Check the browser settings if you have problems using the Web interface.

### Setup via Web Interface over USB




Step	Description
1.	Turn on the instrument.
2.	Start the computer.
3.	Loosen the screw on the SD card/USB port cover.
4.	Open the SD card/USB port cover.
5.	Plug the USB cable into the USB port on the instrument.
6.	Plug the USB cable into the USB port of the computer.
7.	Open a browser and type in the IP address: 192.168.254.2 to access the instruments Web interface.
8.	Use the default <b>User name</b> (Admin) and <b>Password</b> (12345678).  <div>            After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR Series Operational Manual (Online Help) for a step-by-step guide.         </div>
9.	Configure the instrument for all required settings.

### Setup via Web Interface over Bluetooth (GR25 Bluetooth version only)



- a) Left button
- b) Right button
- c) Up button
- d) Cancel button
- e) Down button
- f) Enter button
- g) Display
- h) ON/OFF button

Step	Description
1.	Turn on the GR25.
2.	Use the arrow buttons, go to <b>Configuration, Network Config</b> . Scroll down to the Bluetooth field and use the left button to enable Bluetooth.
3.	Activate bluetooth on your computer and search for Bluetooth devices. The instruments hostname will be listed.
4.	Pair the Bluetooth connection of your computer with the instrument. The default pairing code is 0000. The pairing code can be changed later in the web interface.
5.	Once the pairing is finished, right click on the GR device listed in your Bluetooth devices panel and select <b>Connect</b> .
6.	Go to the <b>Network connections</b> panel of your computer and select the Bluetooth network connection connected to the GR instrument. Right click and open the properties.
7.	Highlight the <b>TCP/IP connection</b> and click on the <b>Properties</b> button.
8.	Enter the IP address <b>192.168.253.x</b> and subnet mask <b>255.255.255.0</b> .
9.	Open a browser and type in the IP address: 192.168.253.2 to access the Web interface.
10.	Use the default <b>User name</b> (Admin) and <b>Password</b> (12345678).   After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR Series Operational Manual (Online Help) for a step-by-step guide.
11.	Configure the instrument for all required settings.

**Web Interface login** Entering the instruments IP address or host name in a browser window displays the web interface login page.

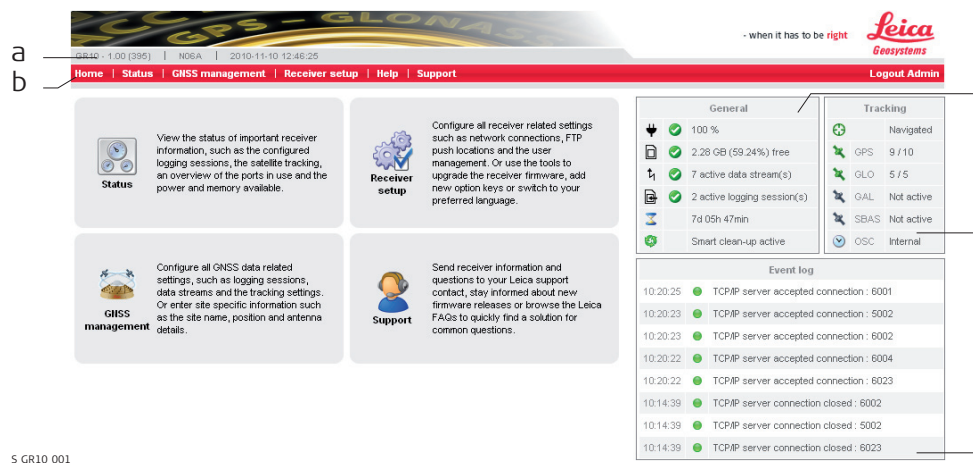
- The home page is also shown after user login.
- For a partially restricted web interface access, the login as guest button can be used. This allows access to all instrument status information.



The login page is not shown if the web interface access level is set to **unrestricted**. The web interface home page is opened directly. For security reasons it is not recommended to set the web interface access to **Unrestricted**. To change the access setting, go to **Receiver Setup / Access Management / Access settings**.

### Web Interface - User Interface

The default appearance of the Web interface consists of the following main components.



S.GR10\_001

- a) Header
- b) Menu Bar
- c) Status: General
- d) Status: Tracking
- e) Status: Event log

### Header

The header contains general information about the instrument.

- Instrument type
- Loaded firmware version
- Site code
- Current system date and time

### Menu Bar

The menu bar at the top of the display contains links to the home page, all status information, GNSS management pages, receiver setup, help and support. The menus are extended when the mouse is moved over a menu item. If a link is not available to a logged in user, it is greyed out and not accessible. Which menu items are available is dependent on

- the selected **Access to Web interface** level, and
- the selected **Web interface user level** of the logged in user.

**Status: General**

Provides an overview of the current status of the instrument. The icons correspond to the LED indicators on the instrument.




**Status: Tracking**

Provides an overview of the current tracking status of the instrument.

**Status: Event log**

Displays the latest eight messages from the **Status / Event log** page.

**Online Help**

Access	Description
	Press the help menu to open the complete online help.
	Press to open context-sensitive help.
	Press to activate hints on the active Web interface page.



Refer to the "GR Series Operational Manual (Online Help)" for detailed information on the Web interface.

## 7.2

## Batteries

### 7.2.1

### Operating Principles

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#### Charging / first-time use

- The battery must be charged prior to using it for the first time.
- The permissible temperature range for charging is between 0°C to +40°C/ +32°F to +104°F. For optimal charging, we recommend charging the batteries at a low ambient temperature of +10°C to +20°C/+50°F to +68°F if possible.
- It is normal for the battery to become warm during charging. Using the chargers recommended by Leica Geosystems, it is not possible to charge the battery if the temperature is too high.

#### For NiCd and NiMH Batteries

- For new batteries or batteries that have been stored for a long time (> three months), it is effectual to make 3 – 5 charge/discharge cycles.

#### For Li-Ion Batteries

- For Li-Ion batteries, a single refreshing cycle is sufficient. We recommend carrying out a refreshing cycle when the battery capacity indicated on the charger or on a Leica Geosystems product deviates significantly from the actual battery capacity available.

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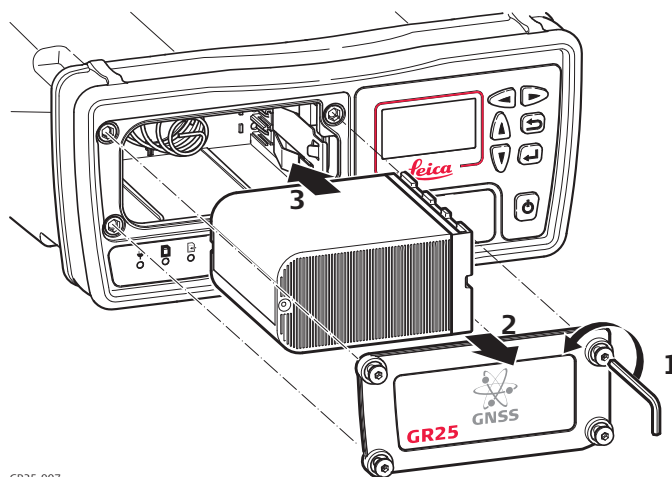
#### Operation / Discharging

- The batteries can be operated from -20°C to +55°C/-4°F to +131°F.
  - Low operating temperatures reduce the capacity that can be drawn; high operating temperatures reduce the service life of the battery.
-

## 7.2.2

## Changing the Battery

Insert and remove the battery on the GR25 step-by-step



GR25\_007

Step	Description
	The battery is inserted in the front of the instrument.
1.	Loosen the screws on the battery compartment with the Allen key provided with the GR25.
2.	Remove the battery cover.
3.	With the arrow facing forward, slide the battery into the battery compartment and push so that it locks into position.
4.	Replace the cover of the battery compartment and tighten the screws.
5.	To remove the battery, loosen the screws and remove the cover of the battery compartment.
6.	Push the ledge on the right side of the battery compartment to the right until it releases the battery.
7.	Pull out the battery.
8.	Replace the cover of the battery compartment and tighten the screws.

## 7.2.3

## Using the GR25 Internal Battery and Charger

### Charging

- Battery charging can be enabled in the GR25 Web Interface. Refer to the "GR Series Operational Manual (Online Help)" for further information.  
Note: When charging the GEB241/GEB242 battery with the GR25 internal charger, it is technically possible to charge the GEB241/GEB242 battery between 0°C to +65°C/ +32°F to +149°F. Please note the internal temperature reading on the GR25 Web Interface.
- When the GR25 is turned on, the battery charging status is indicated in the GR25 Web Interface.
- When the GR25 is powered down, battery charging is indicated via the LEDs. For further information refer to "5.1 LED Indicators on GR25".



- Keep the card dry.
- Use it only within the specified temperature range.
- Do not bend the card.
- Protect the card from direct impacts.

**WARNING**

The SD card must not be removed while the instrument is writing data to the card. To remove the SD card safely, turn off the instrument beforehand.

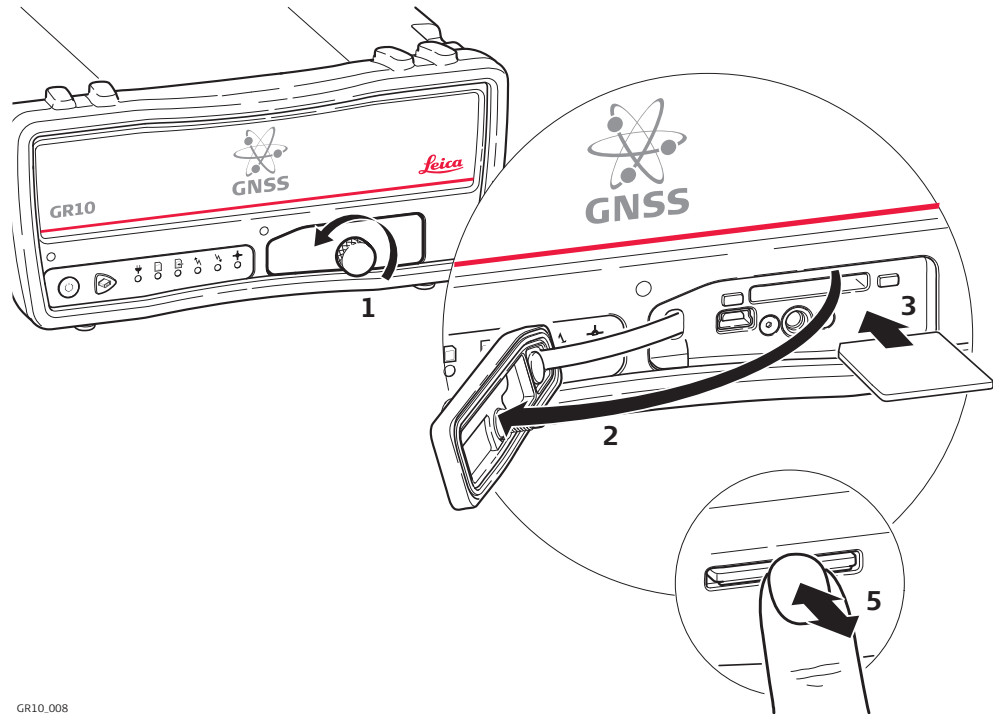
**WARNING**

Ensure that the instrument is off before inserting the SD card. Switching on the instrument will ensure the necessary folder structure is available on the SD card.



Failure to follow these instructions could result in data loss and/or permanent damage to the card.

### Insert and remove an SD card into instrument step-by-step



GR10\_008

Step	Description
	The SD card is inserted into a slot inside the SD card/USB port cover on the front of the instrument.
1.	Loosen the screw on the SD card/USB port cover.
2.	Open the SD card/USB port cover.
3.	Place the SD card into the slot. The card should be held with the contacts downwards and facing the slot. Do not touch the contacts.
4.	Slide the card firmly into the slot until it clicks into position.
5.	To remove the SD card, gently press inwards on the card to release it from the slot.
6.	Place the SD card/USB port cover back over the slot and tighten the cover screw.

## 7.4

### 7.4.1

## Working with Radio, Modem and GSM Devices

### General

#### Description

Various devices can be used with the instrument, including

- GSM/Radio GFU devices connected via a serial port
- Slot-in devices
- External Modems connected via a serial port
- External Radios connected via a serial port

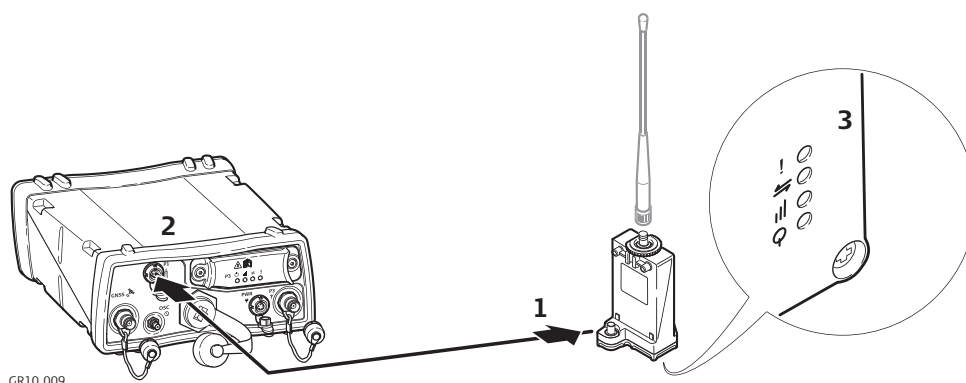
### 7.4.2

#### Serial Devices

#### Devices fitting into a GFU housing

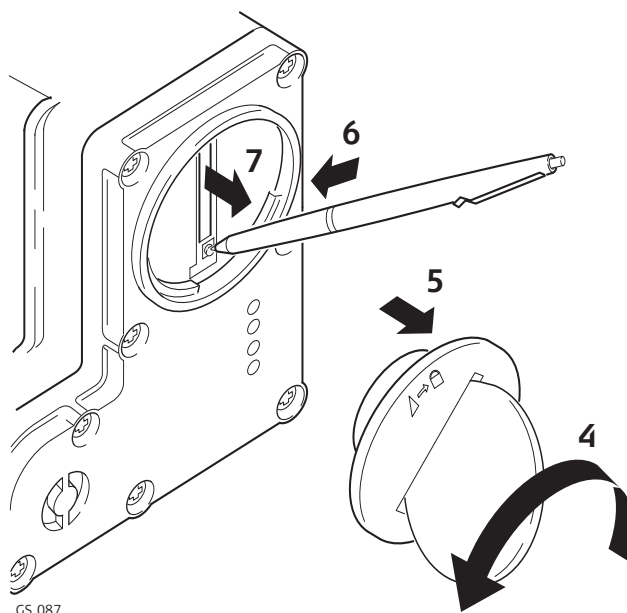
For an up to date list of supported GFU devices, please refer to the latest Spider Equipment list, or ask your local Leica Geosystems representative.

#### Connecting a GFU device to a GR10/GR25



Step	Description
1.	Connect the GEV232 or GEV233 GFU cable to the serial port on the GFU housing.
2.	Connect the GEV232 or GEV233 GFU cable to the serial port on the GR10/GR25.
3.	The GFU device is successfully connected to the instrument when the LEDs on the GFU are on.

## Insert and remove a SIM card step-by-step for an external GFU device



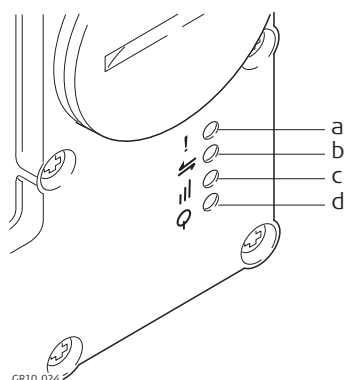
Step	Description
	The SIM card is inserted into a slot on the bottom of the GFU housing.
1.	Take the SIM card, a coin and a pen.
2.	Locate the SIM card screw, that covers the SIM card slot, on the bottom of the GFU housing.
3.	Insert the coin into the groove of the SIM card screw.
4.	Turn the coin anticlockwise to loosen the SIM card screw.
5.	Remove the SIM card screw from the housing.
6.	Using the pen, press the small button of the SIM card slot to eject the SIM card holder.
7.	Take the SIM card holder out off the housing.
8.	Put the SIM card into the SIM card holder, the chip facing up.
9.	Insert the SIM card holder into the SIM card slot, the chip facing the connectors inside the slot.
10.	Place the SIM card screw back on the housing.
11.	Insert the coin into the groove of the SIM card screw.
12.	Turn the coin clockwise to tighten the SIM card screw.

## LED indicators

### Description

Each GFU housing for a radio or digital cellular phones has **L**ight **E**mitting **D**iode indicators on the bottom side. They indicate the basic device status.

### Diagram



- a) Warning LED, available for Satelline 3AS
- b) Data transfer LED
- c) Signal strength LED
- d) Power LED

### Description of the LED's

IF the	on	is	THEN
Warning LED	GFU14 with Sateline 3AS	red	the device is in the configuration mode controlled from the PC via cable.
Data transfer LED	any device	off	data is not being transferred.
		green or flashing green	data is being transferred.
Signal strength LED	GFU19 (US), GFU25 (CAN), GFU26 (US), GFU28 with CDMA Multi-Tech MTMMC-C	red	device is on, not registered on the network.
		flashing red	device is on, registered on the network.
		off	download mode or device is off.
	GFU24 with Siemens MC75	red	call is in progress.
		red: long flash, long break	no SIM card inserted, no PIN entered or network search, user authentication or network login in progress.
		red: short flash, long break	logged onto network, no call in progress.
		red: flashing red, long break	GPRS PDP context activated.
		red: long flash, short break	Packet switched data transfer is in progress.
		off	device is off.
	GFU29 with Cinterion PXS8	off	LED has not been activated by the GR10/GS25.
		500 ms on and 500 ms off	network searching or limited GSM/UMTS service due to missing SIM or PIN.
		Flashing every 4 s	registered to network, but no data transfer in progress.
		Flashing every 2 s	packet service data transfer in progress.
		Flashing every 1 s	circuit switched data transfer in progress (GSM/UMTS only).
	GFU14 with Sateline 3AS	red or flashing red	the communication link, <b>Data Carrier Detection</b> , is okay on the roving receiver.
		off	the DCD is not okay.
Power LED	GFU29 with Cinterion PXS8	off	power is completely off OR GSM module is shut down. 10 s power down are required to restart.
		green	power is on AND GSM module is ready.
	any other device	off	power is off.
		green	power is okay.

7.4.3

Slot-in Devices

Devices fitting into the GR10/GR25

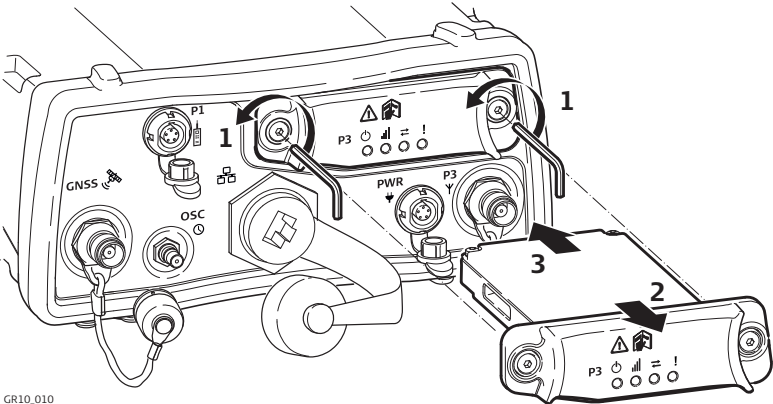
Digital cellular phones fitting into the slot-in port (P3)

Digital cellular phone	Device
Telit 3G GSM/GPRS/UMTS	SLG1-2
CINTERION MC75i GSM/GPRS/UMTS	SLG2-2

Radios fitting into the slot-in port (P3)

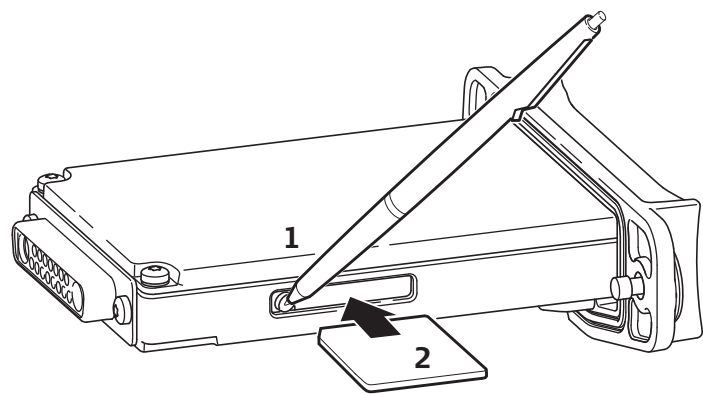
Radio	Device
Satellite TA11 (TX only)	SLR1-2
Satellite M3-TR1 (TX/RX)	SLR5-1

Insert and remove a slot-in-device in a GR10/GR25





Step	Description
1.	Loosen the screws of the Communication Slot-in port (P3) with the Allen key that is supplied with the slot-in device.
2.	Remove the compartment cover and attach it to the slot-in device.
3.	Insert the slot-in device into the P3 Slot-in port. ☞ The LED's on the device must point downwards.
4.	Tighten the screws. ☞ All screws have to be tightened to ensure that the instrument is waterproof.
5.	Attach the antenna for the slot-in device to Communication Slot-in port Antenna (P3), which is located below the Slot-in port next to the Power port (PWR).

**Insert and remove a  
SIM card step-by-  
step**



GR10.011

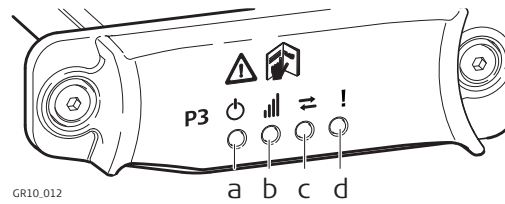
Step	Description
	The SIM card is inserted into a slot on the side of the slot-in-device.
	Take the SIM card and a pen.
1.	Using the pen, press the small button of the SIM card slot to eject the SIM card holder.
2.	Take the SIM card holder out of the slot-in-device.
3.	Place the SIM card into the SIM card holder, the chip facing up.
4.	Insert the SIM card holder into the SIM card slot, the chip facing the connectors inside the slot.

## LED indicators

### Description

Each slot-in-device for a radio or digital cellular phones has **Light Emitting Diode** indicators on the bottom side. They indicate the basic device status.

### Diagram



- a) Mode LED, available for Sateline TA11
- b) Signal strength LED
- c) Data transfer LED
- d) Power LED

### Description of the LEDs

IF the	on	is	THEN
Mode LED	SLR1-2 with Sateline TA11/SLR5-1 with Sateline M3-TR1	red	the device is in the programming mode controlled from the PC via cable.
Data transfer LED	any device	off	data is not being transferred.
		flashing green	data is being transferred.
Signal strength LED	SLG1-2 with Telit 3G, SLG2-2 with Cinterion MC75i	red	call is in progress.
		red: long flash, long break	no SIM card inserted, no PIN entered or network search, user authentication or network login in progress.
		red: short flash, long break	logged on to network, no call in progress.
		red: flashing red, long break	GPRS PDP context activated.
		red: long flash, short break	Packet switched data transfer is in progress.
		off	device is off.
	SLR1-2 with Sateline TA11/SLR5-1 with Sateline M3-TR1	red	the communication link, <b>Data Carrier Detection</b> , is okay on the roving instrument.
		flashing red	the communication link, <b>Data Carrier Detection</b> , is okay on the roving instrument, but signal is weak.
		off	the DCD is not okay.
Power LED	any device	off	power is off.
		green	power is okay.

## 8 Care and Transport

### 8.1 Transport

---

<b>Transport in a road vehicle</b>	Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container, original packaging or equivalent and secure it.
<b>Shipping</b>	When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.

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### 8.2 Storage

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<b>Product</b>	Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "Technical Data" for information about temperature limits.
<b>Li-Ion batteries</b>	<ul style="list-style-type: none"><li>• Refer to "Technical Data" for information about storage temperature range.</li><li>• Remove batteries from the product and the charger before storing.</li><li>• After storage recharge batteries before using.</li><li>• Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.</li></ul> <b>For NiCd and NiMH Batteries</b> <ul style="list-style-type: none"><li>• A storage temperature range of 0°C to +20°C/+32°F to 68°F in a dry environment is recommended to minimise self-discharging of the battery.</li><li>• At the recommended storage temperature range, batteries containing a 50% to 100% charge can be stored for up to 180 days. After this storage period the batteries must be recharged.</li></ul> <b>For Li-Ion batteries</b> <ul style="list-style-type: none"><li>• A storage temperature range of 0°C to +30°C / +32°F to +86°F in a dry environment is recommended to minimize self-discharging of the battery.</li><li>• At the recommended storage temperature range, batteries containing a 40% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.</li></ul>

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### 8.3 Cleaning and Drying

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<b>Product and accessories</b>	<ul style="list-style-type: none"><li>• Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol. Do not use other liquids; these may attack the polymer components.</li></ul> <b>For power supplies and chargers:</b> <ul style="list-style-type: none"><li>• Use only a clean, soft, lint-free cloth for cleaning.</li></ul>
<b>Cables and plugs</b>	Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C/104°F and clean them. Remove the battery cover and dry the battery compartment. Do not repack until everything is dry. Always close the transport container when using in the field. Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.
<b>Connectors with dust caps</b>	Wet connectors must be dry before attaching the dust cap.

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## 9

## Technical Data

### 9.1

### GR10/GR25 Technical Data

#### 9.1.1

#### Tracking Characteristics

Instrument technology

Satellite reception

Instrument channels

Supported codes and phases

SmartTrack

Multi-frequency, GPS, GLONASS, Galileo, BeiDou, QZSS and SBAS.

Depending on the satellite systems and signals configured for use, a maximum number of up to 120 channels is allocated.

GPS

Type	L1	L2	L5
GR10/GR25	Carrier phase, C/A-code	Carrier phase, C-code (L2C) and P2-code	Carrier phase, code

GLONASS

Type	L1	L2
GR10/GR25	Carrier phase, C/A-code	Carrier phase, P2-code, C-code

Galileo

Type	E1	E5a	E5b	Alt-BOC
GR10/GR25	Carrier phase, code	Carrier phase, code	Carrier phase, code	Carrier phase, code

BeiDou

Type	B1	B2
GR10/GR25	Carrier phase, code	Carrier phase, code

QZSS

Type	L1	L2	L5
GR10/GR25	Carrier phase, code	Carrier phase, C-code	Carrier phase, code

GPS Carrier tracking

Condition	GR10/GR25
L1, AS off or on	Reconstructed carrier phase via C/A-code.
L2, AS off	Reconstructed carrier phase via P2-code.
L2, AS on	Switches automatically to patented P-code aided technique providing full L2 reconstructed carrier phase.

## GPS code measurements

Condition	GR10/GR25
L1, AS off L1, AS on	Carrier phase smoothed code measurements: C/A-code.
L2, AS off	Carrier phase smoothed code measurements: P2-code and/or L2C code.
L2, AS on	Carrier phase smoothed code measurements: Patented P-code aided code and/or L2C code.



Carrier phase and code measurements on L1, L2 and L5 (GPS) are fully independent with AS on or off.

## Code and Phase measurement precision (irrespective whether AS off/on)

Condition	GR10/GR25
Carrier phase L1/L2*	0.2mm rms/0.2mm rms.
Code (pseudorange) on L1/L2*	2cm rms/2cm rms.

\* L5/E1/E5a/E5b/Alt-BOC values are expected to be like L1. Final values will be determined after initial operational capability (IOC) has been reached.



Accuracy is dependent upon various factors including the number of satellites tracked, constellation geometry, observation time, ephemeris accuracy, ionospheric disturbance, multipath and resolved ambiguities.

The following accuracies, given as **root mean square**, are based on measurements processed using Leica Geo Office and the Bernese Software.

The use of multiple GNSS systems can increase accuracy by up to 30% relative to GPS only.

#### Accuracy (rms) single receiver navigation mode

Navigation accuracy 5–10 m rms for each coordinate  
Degradation possible due to Selective Availability

#### Accuracy in differential code mode

The baseline precision of a differential code solution for static and kinematic surveys is 25 cm.

#### Accuracy in differential phase mode

##### Accuracy (rms) with Real Time (RTK) with GR10/GR25 plus AS10\*

Static (Rapid)		Kinematic	
Horizontal	Vertical	Horizontal	Vertical
5 mm + 0.5 ppm	10 mm + 0.5 ppm	10 mm + 1 ppm	20 mm + 1 ppm

##### Accuracy (rms) with post processing with GR10/GR25 plus AS10\*

Static (Rapid)		Kinematic	
Horizontal	Vertical	Horizontal	Vertical
5 mm + 0.5 ppm	10 mm + 0.5 ppm	10 mm + 1 ppm	20 mm + 1 ppm

##### Accuracy (rms) with post processing with GR10/GR25 plus AR10/20/25\*

Static (Long observation)	
Horizontal	Vertical
3 mm + 0.1 ppm	3.5 mm + 0.4 ppm

Note: The above values based on post processing using Leica Geo Office. Using specialist scientific software (Bernese) available from Leica Geosystems the following accuracies can be achieved in static post processing mode, even on very long baselines:

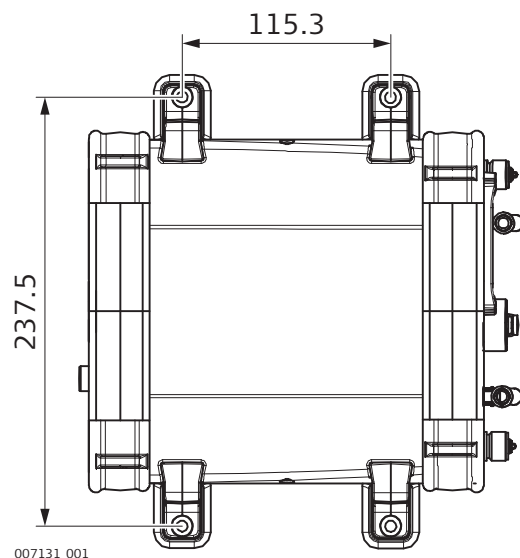
- 2 - 4 mm in plan
- 3 - 6 mm in height

\*Measurement precision, accuracy and reliability are dependent upon various factors including number of satellites, geometry, obstructions, observation time, ephemeris accuracy, ionospheric conditions, multipath etc. Figures quoted assume normal to favorable conditions. Times required are dependent upon various factors including number of satellites, geometry, ionospheric conditions, multipath etc. GPS and GLONASS can increase performance and accuracy by up to 30% relative to GPS only. A full Galileo and GPS L5 constellation will further increase measurement performance and accuracy.

**Dimensions**

The dimensions are given for the housing without the sockets.

GR10/GR25	Length [cm]	Width [cm]	Thickness [cm]
Without bumpers	21.0	19.0	7.8
With bumpers	22.0	20.0	9.4

**Drill hole dimensions for holder****Weight****GR10 weight:**

Type	Weight [kg]
Without bumpers	1.50
With bumpers	1.67

**GR25 weight:**

Type	Weight [kg]
Without battery*	1.84
With battery*	2.29

\* With bumpers

## Recording

Data can be recorded on the SD card.



The figures shown are accurate to 1%. They are dependent on the additional tracking settings configured on the instrument.

### 4 GB card, GPS (L1+L2+L5), 12 satellites

Rate	MDB only	RINEX only	Hatanaka only
1 s	2180 h 3700 h zipped	450 h 1700 h zipped	1700 h 4500 h zipped
30 s	56550 h 95780 h zipped	12650 h 47380 h zipped	49700 h 108000 h zipped

### 4 GB card, GPS + GLONASS (L1+L2), 12/10 satellites

Rate	MDB only	RINEX only	Hatanaka only
1 s	1400 h 2400 h zipped	330 h 1240 h zipped	1220 h 3280 h zipped
30 s	38400 h 65000 h zipped	9100 h 34000 h zipped	36400 h 74800 h zipped

### 4 GB card, GPS + GLONASS + Galileo (L1+E5a+E5b+AltBoc), 12/10/10 satellites

Rate	MDB only	RINEX only	Hatanaka only
1 s	840 h 1400 h zipped	185 h 700 h zipped	680 h 1800 h zipped
30 s	23800 h 40300 h zipped	5050 h 19000 h zipped	20400 h 41350 h zipped

## Power

### 24 V Power supply

Condition	Power consumption	
	GR10	GR25
Logging at 1 Hz, with only the power supply and antenna connected	3.1 W	3.1 W
Logging and streaming at 1 Hz, with power supply, antenna and ethernet connected	3.5 W	3.3 W

GR10 Power consumption: 3.5 W typically, 24 V@150 mA

GR25 Power consumption: 3.3 W typically, 24 V@140 mA

External supply voltage: Nominal 12 V DC (---, GEV71 car battery cable to a 12 V car battery), voltage range 10.5 V-28 V DC

## Battery internal

### GR25 only:

Type: Li-Ion  
Voltage: 14.8 V  
Capacity: GEB241: 4.8 Ah  
GEB242: 5.8 Ah

## Battery external

Type: NiMH  
Voltage: 12 V  
Capacity: GEB171: 9.0 Ah

**Operating times**

Designed for continuous operation.

**Environmental specifications****Temperature**

Type	Operating temperature [°C]	Storage temperature [°C]
Instrument	-40 to +65	-40 to +80
Leica SD cards	-40 to +85	-40 to +85
Battery internal	-20 to +65	-40 to +70

**Protection against water, dust and sand**

Type	Protection
Instrument	IP67 (IEC 60529) Dust tight Waterproof to 1 m temporary immersion

**Humidity**

Type	Protection
Instrument	Up to 100 % The effects of condensation are to be effectively counter-acted by periodically drying out the instrument.

**Connector types**

Port	Description
PWR	LEMO-1 female, 5 pin
Serial P1	LEMO-1 female, 8 pin
Serial P2 / Event *	LEMO-1 female, 8 pin
GNSS Antenna	TNC female
P3 Slot-in Antenna	TNC female
Oscillator	MMCX female, 24QMA-50 2-3/133, 5/10 Mhz
Ethernet	RJ45 ruggedised, 10/100Mbit
PPS *	LEMO ERN.OS.250.CTL
USB client	Type Mini B
Bluetooth/WLAN antenna *	SMA Male
USB host *	Standard Type A



\* GR25 only

**Power port****All receivers**

Description	5 pin LEMO supporting dual power inputs
Connector	LEMO-1, 5 pin, LEMO HMG.1B.306.CLNP

**Serial ports**

Port	Description	Default setting
P1	Baud rates 2400-115200 baud, incl. RTS/CTS	115200/N/8/1/N
P2 (GR25 only)	Baud rates 2400-115200 baud, incl. RTS/CTS	115200/N/8/1/N

<b>Data output</b>	<ul style="list-style-type: none"> <li>• Raw Data</li> <li>• Almanac</li> <li>• Ephemeris</li> <li>• Position data</li> </ul>	
<b>USB client port</b>	Support:	USB 2.0
	Speed:	Full speed, 12 Mbit/s (1,5 MB/s)
<b>USB host port</b>	<b>GR25 only:</b>	
	Support:	USB 2.0
	Speed:	High speed, 480 Mbit/s (60 MB/s)
	Output power:	500 mA (5 V) => Support devices up to 2.5 W
<b>External oscillator</b>	<b>All receivers</b>	
	Frequency:	5 MHz or 10 MHz
	Input impedance:	50Ω nominal
	Input VSWR:	2:1 maximum
	Signal level:	0 dBm minimum to +13.0 dBm maximum
	Frequency stability:	+0.5 ppm maximum
	Wave shape:	Sinusoidal
	Connector:	MMCX female - 24QMA-50-2-3/133
	 On the GR10/GR25, remove the External oscillator port cover before connecting the cable.	
	 Internal Oscillator aligned to GPS time within 10 ns.	
<b>Ethernet network interface</b>	<b>All receivers</b>	
	IEEE Standards:	802.3 10BASE-T Ethernet 802.3u 100BASE-TX Fast Ethernet 802.3 Auto-negotiation
	Link Speed:	10/100 MB, Half/Full Duplex
	Protocol:	CSMA/CD
	Connector:	Ruggedised RJ45
<b>Bluetooth</b>	Type:	Bluetooth 2.0
	Enhanced Data Rate:	EDR maximum 2.1 Mbits/s
	Connector:	SMA male
<b>WLAN</b>	Type (single stream):	IEEE 802.11 bg and n
	Network authentication:	Open, Shared, WPA-PSK (no server), WPA-NONE, WPA, WPA2, WPA2-PSK (no server)
	Encryption type:	Disabled, WEP, TKIP, AES
	Connector:	SMA male

**Description and use** The antenna is selected for use based upon the application. The table gives a description and the intended use of the individual antennas.

Type	Description	Use
AR25	Dorne & Margolin GPS, GLONASS, Galileo, BeiDou, QZSS antenna element with 3D choke ring ground plane. Optional protective radome.	High end applications, including all reference station and monitoring. Especially good for scientific studies where excellent low elevation tracking is required.
AR20	GPS, GLONASS, Galileo, BeiDou, QZSS reference station and monitoring antenna with gold choke ring ground plane. Optional protective radome.	High end applications, including all reference station and monitoring. Especially suited for Network RTK, where excellent multipath rejection and the best phase centre stability is required.
AR10	GPS, GLONASS, Galileo, BeiDou, QZSS reference station and monitoring antenna with large ground plane and built-in radome.	General use for standard and high accuracy reference station and monitoring applications.
AS10	Compact geodetic GPS, GLONASS, Galileo, BeiDou, QZSS antenna with built-in ground plane.	Standard network RTK and monitoring applications.

### Dimensions

Type	AR25	AR20	AR10	AS10
Height	20.0 cm	16.3 cm	14.0 cm	6.2 cm
Diameter	38.0 cm	32.0 cm	24.0 cm	17.0 cm

### Connector

AR25:	N-Type female, with TNC adapter supplied
AR20:	N-Type female, with TNC adapter supplied
AR10:	TNC female
AS10:	TNC female

### Mounting

All antennas:	5/8" Whitworth Thread
---------------	-----------------------

### Weight

AR25:	8.1 kg, radome 1.1 kg
AR20	5.9 kg
AT504 GG:	4.3 kg, radome 1.1 kg
AR10:	1.1 kg
AS10:	0.4 kg

## Electrical data

Type	AR25	AR20	AR10	AS10
Voltage	3.3 V to 12 V DC	3.3 V to 12 V DC	3.3 V to 12 V DC	4.5 V to 18 V DC
Current	100 mA max	100 mA max	100 mA max	35 mA typical
Frequency				
GPS:	L1, L2 (including L2C), L5	L1, L2 (including L2C), L5	L1, L2 (including L2C), L5	L1, L2 (including L2C), L5
GLONASS:	L1, L2, L3, L5	L1, L2, L3, L5	L1, L2, L3, L5	L1, L2, L3, L5
Galileo:	E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC), E6	E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC), E6	E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC), E6	E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC)
BeiDou:	B1, B2, B3	B1, B2, B3	B1, B2, B3	B1, B2
QZSS	L1, L1C, L2C, L5, L1-SAIF, LEX	L1, L1C, L2C, L5, L1-SAIF, LEX	L1, L1C, L2C, L5, L1-SAIF, LEX	L1, L1C, L2C, L5, L1-SAIF
L-Band	SBAS, Omni-STAR, Veripos	SBAS, Omni-STAR, Veripos	SBAS, Omni-STAR, Veripos	SBAS, Veripos
Gain (typically)	40 dBi	29 dBi	29 dBi	27 dBi
Noise Figure (typically)	< 1.2 dBi max	< 2 dBi	< 2 dBi	< 2 dBi

## Environmental specifications

### Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
AR25	-55 to +85	-55 to +90
AR20	-55 to +85	-55 to +85
AR10	-40 to +70	-55 to +85
AS10	-40 to +70	-55 to +85

Operating temperatures in compliance with ISO9022-10-08, ISO9022-11-05 and MIL-STD-810G, Method 502.5-II, MIL-STD-810G, Method 501.5-II

Storage temperatures in compliance with ISO9022-10-08, ISO9022-11-06 and MIL-STD-810G, Method 502.5-I, MIL-STD-810G, Method 501.5-I

### Protection against water, dust and sand

Type	Protection
All antennas	IP67 (IEC 60529) Dust tight Protected against water jets Waterproof to 1 m temporary immersion

### Humidity

Type	Protection
All antennas	Up to 100 % Compliance with ISO9022-13-06, ISO9022-12-04 and MIL-STD-810G Method 507.5-I The effects of condensation are to be effectively counteracted by periodically drying out the antenna.

### Cable length

Instrument	Antenna	Available cable lengths for all antennas [m]
GR10/GR25	All antennas	1.2, 2.8, 10, 30, 50 and 70

## 9.3

### 9.3.1

## Conformity to National Regulations

### GR10 & GR25

#### Conformity to national regulations

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the products GR10, GR25, AR10, AR20, AR25, AS10 are in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity can be consulted at <http://www.leica-geosystems.com/ce>.



Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA member state.

- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

#### Frequency band

Type	Frequency band [MHz]
GR10/GR25	GPS L1: 1575.42 GPS L2: 1227.60 GPS L5: 1176.45 GLONASS L1: 1598.0625 - 1609.3125 GLONASS L2: 1242.9375 - 1251.6875 Galileo E1: 1575.42 Galileo E5a: 1176.45 Galileo E5b: 1207.14 Galileo AltBOC: 1191.795 BeiDou B1: 1561.098 BeiDou B2: 1207.14 QZSS L1: 1575.42 QZSS L2: 1227.60 QZSS L5: 1176.45

#### Output power

Type	Output power [mW]
GNSS	Receive only

#### Antenna

Type	Antenna	Gain [dBi]	Connector	Frequency band [MHz]
GNSS	External GNSS antenna element (receive only)	-	-	-

**Conformity to national regulations**

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the GFU24 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at <http://www.leica-geosystems.com/ce>.



Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.

- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

**Frequency band**

Quad-Band EGSM850 MHz/ EGSM900 MHz/ GSM1800 MHz/ GSM1900 MHz

**Output power**

EGSM850/900: 2 W  
GSM1800/1900: 1 W

**Antenna**

Type	GAT3	GAT5	GAT18
Frequency band [MHz]	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170
Type	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
Connector	TNC	TNC	TNC

**Specific Absorption Rate (SAR)**

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

**Conformity to national regulations**

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the GFU28 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at <http://www.leica-geosystems.com/ce>.



Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.

- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

**Frequency band**

UMTS/HSDPA (WCDMA/FDD) 850 MHz/ 1900 MHz/ 2100 MHz  
 Quad-Band EGSM 850 MHz/ 900 MHz/ 1800 MHz/ 1900 MHz  
 GPRS multi-slot class 12  
 EDGE multi-slot class 12

**Output power**

EGSM850/900: 2 W  
 GSM1800/1900: 1 W  
 UMTS2100: 0.25 W  
 EDGE850/900: 0.5 W  
 EDGE1800/1900: 0.4 W

**Antenna**

Type	GAT3	GAT5	GAT18
Frequency band [MHz]	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170
Type	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
Connector	TNC	TNC	TNC

**Specific Absorption Rate (SAR)**

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.



**Conformity to national regulations**

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the GFU29 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at <http://www.leica-geosystems.com/ce>.



Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.

- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

**Frequency band**

UMTS/HSPA (WCDMA/FDD) 800 MHz/ 850 MHz/ 900 MHz/ 1900 MHz/ 2100 MHz  
(E)GSM 850 MHz/ 900 MHz/ 1800 MHz/ 1900 MHz  
GPRS/EDGE multi-slot class 12

**Output power**

UMTS/HSPA: 0.25 W  
EGSM850/900: 2 W (EDGE: 0.5 W)  
GSM1800/1900: 1 W (EDGE: 0.4 W)

**Antenna**

Type	GAT3	GAT5	GAT18
Frequency band [MHz]	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170
Type	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
Connector	TNC	TNC	TNC

**Specific Absorption Rate (SAR)**

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

**Conformity to national regulations**

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the SLG1-2 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at <http://www.leica-geosystems.com/ce>.



Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.

- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

**Frequency band**

UMTS/HSDPA (WCDMA/FDD) 850 MHz/ 1900 MHz/ 2100 MHz  
 Quad-Band EGSM 850 MHz/ 900 MHz/ 1800 MHz/ 1900 MHz  
 GPRS multi-slot class 12  
 EDGE multi-slot class 12

**Output power**

EGSM850/900: 2 W  
 GSM1800/1900: 1 W  
 UMTS2100: 0.25 W  
 EDGE850/900: 0.5 W  
 EDGE1800/1900: 0.4 W

**Antenna**

Type	GAT3	GAT5	GAT18
Frequency band [MHz]	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170
Type	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
Connector	TNC	TNC	TNC

**Specific Absorption Rate (SAR)**

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

**Conformity to national regulations**

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the SLG2-2 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at <http://www.leica-geosystems.com/ce>.



Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.

- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

**Frequency band**

Quad-Band EGSM850 MHz/ EGSM900 MHz/ GSM1800 MHz/ GSM1900 MHz

**Output power**

EGSM850/900: 2 W  
GSM1800/1900: 1 W

**Antenna**

Type	GAT3	GAT5	GAT18
Frequency band [MHz]	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170
Type	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
Connector	TNC	TNC	TNC

**Specific Absorption Rate (SAR)**

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

**Conformity to national regulations**

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product SLR1-2 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity can be consulted at <http://www.leica-geosystems.com/ce>.



Class 2 equipment according European Directive 1999/5/EC (R&TTE)

- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

**Frequency band**

403 MHz - 470 MHz

**Output power**

SLR1-2: 0.5 W-1.0 W

**Antenna**

Type	GAT1	GAT2
Frequency band [MHz]	400 - 435	435 - 470
Type	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
Connector	TNC	TNC

**Specific Absorption Rate (SAR)**

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

**Conformity to national regulations**

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product SLR5-1 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity can be consulted at <http://www.leica-geosystems.com/ce>.



Class 2 equipment according European Directive 1999/5/EC (R&TTE).

- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.
- Japanese Radio Law and Japanese Telecommunications Business Law Compliance.
  - This device is granted pursuant to the Japanese Radio Law and the Japanese Telecommunications Business Law.
  - This device should not be modified (otherwise the granted designation number will become invalid).

**Frequency band**

403 MHz - 470 MHz

**Output power**

SLR5-1: 0.5 W-1.0 W

**Antenna**

Type	GAT1	GAT2
Frequency band [MHz]	400 - 435	435 - 470
Type	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
Connector	TNC	TNC

**Specific Absorption Rate (SAR)**

The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.

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---

## Appendix A      Directory Structure of the Memory Device

---

<b>Directory structure (SD card)</b>	--- DATA	Storing raw data logging data
	--- Session1*	
	--- Session2*	
	--- Session3*	
	--- Transfer	Upload and download files
	--- Antenna	Upload antenna files
	--- Firmware	Upload firmware files
	--- Options	Upload option files
	--- Language	Upload language files
	--- Settings	Upload system configuration

---

**Directory structure  
(via FTP access)**      When accessing the GR10/GR25 via FTP, the folder structure is as follows:

--- SD Card	
--- DATA	Storing raw data logging data
--- Session1*	
--- Session2*	
--- Session3*	
--- Transfer	Upload and download files
--- Antenna	Upload antenna files
--- Firmware	Upload firmware files
--- Options	Upload option files
--- Language	Upload language files
--- Settings	Upload system configuration

---

<b>Directory structure (USB Disks)</b>	--- USB Disks**	
	--- DATA	Storing raw data logging data
	--- Session1*	
	--- Session2*	
	--- Session3*	
	--- Transfer	Upload and download files
	--- Antenna	Upload antenna files
	--- Firmware	Upload firmware files
	--- Options	Upload option files
	--- Language	Upload language files
	--- Settings	Upload system configuration

\* The name of the directory shown will be the configured Logging session name. For example an MDB, RINEX or Hatanaka raw data logging session. Refer to the "GR Series Operational Manual (Online Help)" for further information.

\*\*For GR25 only

---

## Appendix B Pin Assignments and Sockets

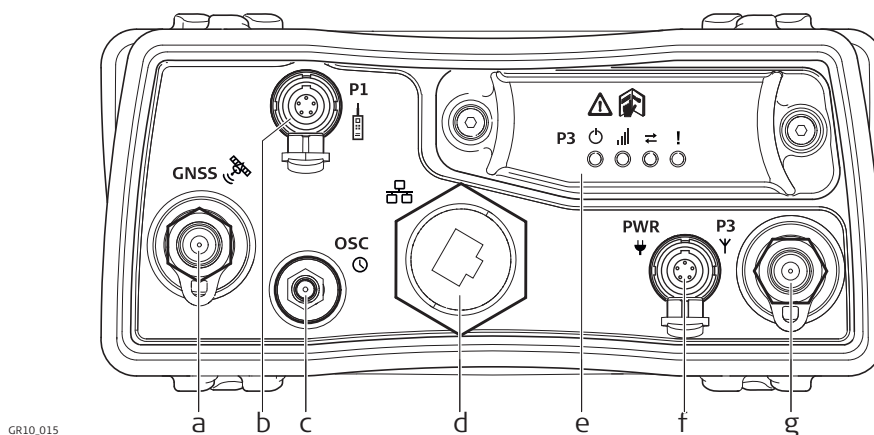
### B.1

### GR10

#### Description

Some applications require knowledge of the pin assignments for the GR10 ports. In this chapter, the pin assignments and sockets for the ports of the GR10 are explained.

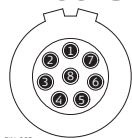
#### Ports on the instrument rear panel



- a) **GNSS**: GNSS Antenna port TNC
- b) **P1**: Serial port, 8 pin LEMO
- c) **OSC**: Oscillator port
- d) **Ethernet port**: Ruggedised RJ45

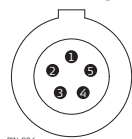
- e) **P3**: Communication Slot-in port
- f) **PWR**: Power port, 5 pin LEMO, dual input
- g) **P3**: Communication Slot-in port Antenna, TNC

#### Pin assignments for P1: Serial Port



Pin	Signal Name	Function	Direction
1	RTS	RS232, ready to send	Out
2	CTS	RS232, clear to send	In
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In or out
7	GPIO	RS232, configurable function	In or out
8	+12 V	12 V power supply out	Out

#### Pin assignments for PWR: Power port



Pin	Signal Name	Function	Direction
1	PWR1	Power input, 10.5 V-28 V	In
2	ID1	Identification pin	In
3	GND	Signal ground	-
4	PWR2	Power input, 10.5 V-28 V	In
5	ID2	Identification pin	In

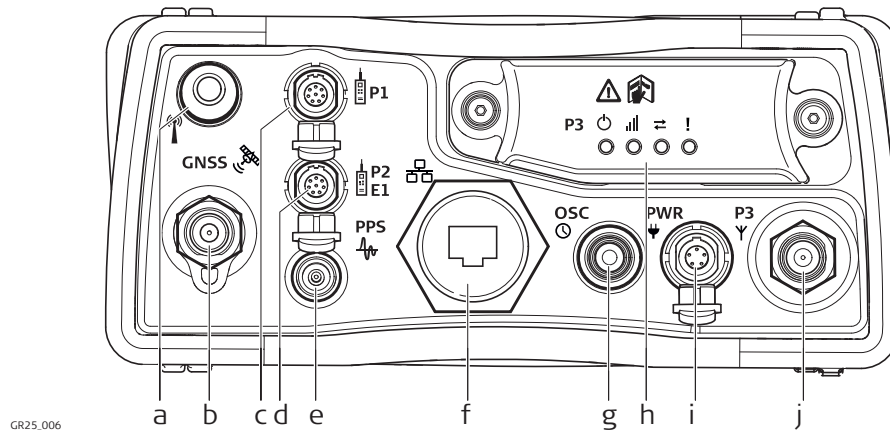
#### Sockets

Port P1: LEMO-1, 8 pin, LEMO EGI.1B.308.CLN  
Port PWR: LEMO-1, 5 pin, LEMO HMG.1B.305.CLNP

## Description

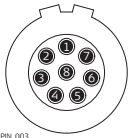
Some applications require knowledge of the pin assignments for the GR25 ports. In this chapter, the pin assignments and sockets for the ports of the GR25 are explained.

### Ports on the instrument rear panel



- a) **BT/WLAN:** BT/WLAN Antenna
- b) **GNSS:** GNSS Antenna port TNC
- c) **P1:** Serial port, 8 pin LEMO
- d) **P2:** Serial/Event port, 8 pin LEMO
- e) **PPS:** Pulse per second output
- f) **Ethernet port:** Ruggedised RJ45
- g) **OSC:** Oscillator port
- h) **P3:** Communication Slot-in port
- i) **PWR:** Power port, 5 pin LEMO, dual input
- j) **P3:** Communication Slot-in port Antenna, TNC

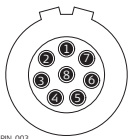
### Pin assignments for P1: Serial Port



PIN\_003

Pin	Signal Name	Function	Direction
1	RTS	RS232, ready to send	Out
2	CTS	RS232, clear to send	In
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In or out
7	GPIO	RS232, configurable function	In or out
8	+12 V	12 V power supply out	Out

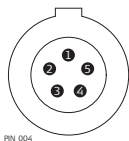
### Pin assignments for P2: Serial Port



PIN\_003

Pin	Signal Name	Function	Direction
1	RTS	RS232, ready to send	Out
2	CTS	RS232, clear to send	In
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In or out
7	GPIO / EVT IN	RS232, general purpose input/output	In or out
8	+12 V	12 V power supply out	Out

**Pin assignments for  
PWR: Power port**



Pin	Signal Name	Function	Direction
1	PWR1	Power input, 10.5 V-28 V	In
2	ID1	Identification pin	In
3	GND	Signal ground	-
4	PWR2	Power input, 10.5 V-28 V	In
5	ID2	Identification pin	In

**Sockets**

Port P1:	LEMO-1, 8 pin, LEMO EGI.1B.308.CLN
Port P2:	LEMO-1, 8 pin, LEMO EGI.1B.308.CLN
Port PWR:	LEMO-1, 5 pin, LEMO HMG.1B.305.CLNP
PPS:	LEMO REN.OS.250.CTL
OSC:	MMCX female - 24QMA-50-2-3/133



**779113-4.0.0en**

Original text

Printed in Switzerland

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